84-1568

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ALEXANDER L. STEVAS
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No.____

IN THE
SUPREME COURT OF THE UNITED STATES

October Term, 1984

QUAKER CITY GEAR WORKS, INC., *et al.*,
Petitioner

v.

SKIL CORPORATION,
Respondent

APPENDIX A TO PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

QUAKER CITY GEAR WORKS, INC. ROTH, KARLHEINZ	:	CIVIL ACTION
vs.	:	
SKIL CORPORATION	:	NO. 79-2287

Interrogatory #1

Do you find that the scope and content of the prior art applicable to the subject matter of the patent includes the following references:

Reference/ Description	Defendant's Exhibits	Yes	No
1956 AGMA Standard Publication 207.04	134		✓
1961 Thoen Paper	43		✓
1961 Thoen Paper	44		✓
1959 Buckingham Manual	51		✓
1942 Japanese Patent 147,790	41		✓
1951 Japanese Publication "A Study on Involute Helical Gears"	57		✓
1960 Roano Patent	36		✓
1948 Vogel Publication	45		✓
1953 Japanese Book "Gear Wheel"	56		✓

Interrogatory #2

Did a person of ordinary skill in the subject of gearing as of December 1963 have:
(Check more than one if applicable.)

1. A bachelor's degree in engineering and at least several years experience in the design of pinions with a small number of teeth, say in the order of 10 or less teeth.

YES ____ NO ____ Could not agree

2. At least some formal education of a technical nature after high school and at least several years experience in the design of pinions with a small number of teeth, say in order of 10 or less teeth.

YES ____ NO ____ Could not agree

Interrogatory #3

Do you find that the prior art being relied upon by Skil, as represented by the following references:

(a) The 1956 AGMA Standard 207.04 (DX-134) and

(b) the Thoen publications regarding four-tooth pinions (DX-43 and DX-44),

is more pertinent than the five patents (DX-32, DX-33, DX-34, DX-37 and DX-39) cited by the United States Patent Office during examination of the Roth application?

YES ____ NO ✓

Interrogatory #4

Do you find that the prior art being relied upon by Skil, as represented by the following references:

(a) Buckingham's Manual of Gear Design (DX-51),

(b) the Japanese patent (DX-41) and Japanese publications (DX-56 and 57),

(c) the Roano patent (DX-36),

(d) the Vogel publication (DX-45),

is more pertinent than the five patents (DX-32, DX-33, DX-34, DX-37 and DX-39) cited by the United States

Patent Office during examination of the Roth application?

YES ___ NO ✓

Interrogatory #5

If you answered Interrogatory No. 3 "Yes" and thus found the 1956 AGMA Standard 207.4 (DX-134) and the 1961 Thoen publications (DX-43 and DX-44) to constitute more pertinent prior art, do you find that plaintiff Roth knew of this prior art and intentionally failed to call it to the attention of the U.S. Patent Office?

YES ___ NO ✓

Interrogatory #6

Do you find that it would have been obvious in December of 1963 for a person having ordinary skill in the art of small gear design, who had before him the 1956 AGMA Standard 207.04 (DX-134) to design a 4-tooth helical pinion which would satisfactorily mesh with a complimentary gear of helical form?

YES ___ NO ✓

Interrogatory #7

Do you find that it would have been obvious in December of 1963 for a person having ordinary skill in the art of small gear design to modify the Thoen 4-tooth spur pinion (DX-43 and DX-44) to include a helix angle?

YES ___ NO ✓

Interrogatory #8

Do you find that it would have been obvious in December of 1963 for a person having ordinary skill in the art of small gear design, who had before him the Japanese Patent (DX-41) and Japanese publications (DX-56 and DX-57) to design a 4-tooth helical pinion which

would satisfactorily mesh with a complimentary gear of helical form?

YES ___ NO ✓

Interrogatory #9

Do you find that it would have been obvious in December of 1963 for a person having ordinary skill in the art of small gear design, who had before him the Roano patent (DX-36) to design a 4-tooth helical pinion which would satisfactorily mesh with a complimentary gear of helical form?

YES ___ NO ✓

Interrogatory #10

Do you find that it would have been obvious in December of 1963 for a person having ordinary skill in the art of small gear design, who had before him all of the prior art, if any, checked "yes" by you in interrogatory #1 to design a 4-tooth helical pinion which would satisfactorily mesh with a complimentary gear of helical form?

YES ___ NO ___

Not applicable

Interrogatory #11

Does the specification of the Roth patent, that is, the portion of the patent in Columns 1, 2, 3, 4 and the first four lines of Column 5, contain a written description, including its drawings and text, of the alleged invention in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same?

YES ✓ NO ___

Interrogatory #12

Does the specification of the Roth patent, that is, the portion of the patent in Columns 1, 2, 3, 4 and the first four lines of Column 5, contain a written description, including its drawing and text, of the manner and process for making and using the alleged invention in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same?

YES ___ NO ___

Could not agree.

Interrogatory #13

As to each of Claims 1, 2 and 3 of the Roth patent, what is your finding as to whether or not it particularly points out and distinctly claims the subject matter which Roth regarded as his invention in December 1963?

As to Claim 1	YES ✓	NO ___
As to Claim 2	YES ✓	NO ___
As to Claim 3	YES ✓	NO ___

Interrogatory #14

Do you find that Claim 1 of the Roth Patent covers only combinations of helical gears which are inoperable or unworkable?

YES ___ NO ✓

Interrogatory #15

Do you find that the claims of the Roth Patent represent nothing more than an attempt to patent a mathematical expression?

YES ___ NO ✓

Interrogatory #16

Do the claims of the Roth patent represent nothing more than an attempt to patent a desired result, or a numerical limit or standard?

YES ____ NO ✓

Interrogatory #17

Do the claims of the Roth patent cover an arbitrary selection of a range in a known progressive change and thereby attempt to establish exclusive rights with respect to products falling within that range on the ground that the designated range produces optimum results?

YES ✓ NO ____

Interrogatory #18

Do you find that the inequality expression or formula in paragraph (a) of Claim 1 of the Roth patent (see column 5, line 12) is incorrect?

YES ____ NO ✓

Interrogatory #19

If you answered Interrogatory No. 18 "Yes," do you find that plaintiff Roth has attempted to enforce the patent against Skil well knowing that the Roth patent is defective because of the incorrect inequality expression or formula?

YES ____ NO ____

Not applicable.

Interrogatory #20

Did you find that the Skil pinion accused of infringement satisfies the helix angle requirements which are set forth in Paragraph (a) of Claim 1 of the Roth patent and which read:

"both gears are helical and helix angle is given by

$$-0.35z_v + 1.4 < \frac{b \sin B_o}{mn} < 1.5$$

wherein B = helix angle at the pitch cylinder, m_n = module, b = minimum tooth width and z_v = virtual number of teeth;"

YES ✓ NO ___

Interrogatory #21

Do the Skil drills typified by Model 560 use gearing which infringes at least one claim of the Roth patent?

YES ✓ NO ___

Interrogatory #22

If the answer to Interrogatory No. 21 is in the affirmative, is the infringement of the Roth patent by the defendant Skil Corporation willful?

YES ✓ NO ___

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

QUAKER CITY GEAR WORKS, INC. and KARLHEINZ ROTH, *plaintiffs*	:	CIVIL ACTION
vs.	:	
SKIL CORPORATION, *defendant*	:	No. 79-2287

MEMORANDUM

GREEN, *J.* September 21st, 1983

This case involves the alleged infringement of United States Letters Patent No. 3,247,736 entitled "Involute Gear Combinations" which issued April 26, 1966. The court has jurisdiction under 28 U.S.C. §1338(a). The case was tried to a jury on the issue of liability. The jury returned a special verdict by answering interrogatories in accordance with Fed. R. Civ. P. 49(a), after which the parties were given the opportunity to file any relevant motions. Plaintiffs moved for judgment and for the jury to consider the issue of damages. Defendant filed a motion styled as a motion for Judgment Notwithstanding the Verdict as provided in Fed. R. Civ. P. 50(b). Defendant's motion will be granted because plaintiff failed to comply with the specification requirements of 35 U.S.C. §112, thereby rendering its patent invalid.

Plaintiff, Quaker City Gear Works, Inc. ("Quaker") is the holder of the exclusive license under United States Patent No. 3,247,736 ("the Patent") by virtue of a license dated June 18, 1971. It has rights to grant sub-licenses, bring actions for infringement of the patent and collect damages for infringement. Plaintiff Karlheinz Roth is the patentee and owner of the Patent and is the grantor of the license to Quaker. Defendant Skil Corporation

("Skil") is a manufacturer of tools and other equipment. Skil manufactured electric hand held drills, Model Numbers 457, 560, 569, 584, 925, 928, and 931. The gear combination used in those drills was alleged to infringe the Patent.

The Patent related to a comination of involute gears in which the virtual number of teeth on the pinion (the smaller of the two meshing gears) was no more than five. Plaintiffs claim that the Patent was an advance in the art in that both the pinion and the wheel (the other gear) had good load-carrying capabilities, could be manufactured economically, and had good contact ratios.

Skil's argument that the Patent is invalid is based, in part, on the fact that the Patent specification makes six references to German Industrial Standard 58400 Draft September, 1963 ("German Standard") without specifying the standard or attaching a copy. Skil asserts that this incorporation by reference is insufficient to meet the standards of 35 U.S.C. §112.

Section 112 provides:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains . . . to make or use the same, and shall set forth the best mode contemplated by the inventor of carrying out the same.

The parties dispute the degree of specificity required by the statute. Plaintiff argues that the reference to the German Standard is not problematical because it is only a suggested standard, not a mandatory one and therefore not "essential material," requiring disclosure under section 112.

No interrogatory was requested or submitted to the jury concerning whether the German Standard was essential material. Accordingly, under Fed. R. Civ. P. 49(a)

the court may make this finding of fact. The Manual of Patent Examining Procedures §601.01(p)(B) defines "essential material" as "that which is necessary . . . for adequate disclosure of the invention." In light of all the evidence, particularly Prof. Roth's testimony that the German Standard was "necessary" to design the wheel used in a related German patent, I find that the German Standard was "essential material" for the design of the Patent at issue here as well.

In *General Electric Co. v. Brenner*, 407 F.2d 1258, 1262 (D.C. Cir. 1968) the court held that incorporation by reference was permissible in patent law so long as the references were made to information which is available to the public. The court explicitly stated that the rule of incorporation by reference excluded "obscure foreign publications and publications for which there were no available English translations." *Id.* at 1262-63. In addition, the Manual of Patent Examining Procedures §601.01(p)(B) states that essential material may not be incorporated by reference to nonpatent publications, patents or applications published by foreign countries or regional patent offices or to United States patents or applications which incorporate essential material by reference.

It is clear from these guidelines that the reference to the German Standard was insufficient for compliance with the disclosure requirements of section 112. The document is a non-patent publication. It is not available in the United States Patent Office like a United States patent or patent application would be. Furthermore, it is so far removed from public availability that plaintiffs could not locate and produce a copy when so requested by the defendant.

Because of this error of attempting to incorporated the foreign document by reference, the patent does not comply with section 112 and is, therefore, invalid. Accordingly, Skil is entitled to Judgment Notwithstanding the Verdict.

Skil also argues that the jury's answers to the interrogatories should be disregarded because of inconsistencies among them. It is true that the jury's answers do not appear entirely consistent. Most notably, the jury's failure to find that any of the references listed in Interrogatory #1 were prior art seems inconsistent with the evidence of both parties. However, "[w]here there is a view of the case that makes the jury's answers to special interrogatories consistent, they must be resolved that way." *Atlantic and Gulf Stevedores, Inc. v. Ellerman Lines, Ltd.*, 369 U.S. 355, 364 (1962). Since the jury may have found that defendant did not meet its burden of proof on this issue, there is a construction which would render the answer consistent with the remaining interrogatories. Thus, Skil is not entitled to relief on the basis of the inconsistency in the answers.

Skil also points to the jury's failure to agree on an answer to Interrogatory #12 in support of its argument that the jury's findings were so inconsistent that they were not the product of rational decisionmaking.[1] However, when one reviews the jury's answers to the twenty-two interrogatories as a whole, they are sufficiently consistent to indicate the jury's intent to return a verdict for the plaintiffs. In any event, the failure to answer Interrogatory #12 would not entitle Skil to a judgment, but merely to a new trial on the narrow issue raised by that interrogatory. *Franki Foundation Co. v. Alger-Rau & Asso., Inc.*, 513 F.2d 581, 585 (3d Cir. 1975).

Defendant also argues that the trial by jury in this matter violated due process because the technical nature of the evidence was beyond the jury's ability to understand, thereby precluding the jury from rendering a rational decision. In support of its argument, Skil points to the inconsistencies in the jury's answers to interrogato-

---

1. The due process issue raised by this argument will be more fully discussed below.

ries, already discussed. Skil's argument raises the issue of the tension between the fifth amendment right to due process and the seventh amendment right to a jury trial.

This question was confronted in *In re Japanese Electronic Products Antitrust Litigation*, 631 F.2d 1069, 1079 (3d Cir. 1980) in which the court found that some cases may be too complex to be tried to a jury. The court stated that a suit might be "excessively complex as a result of any set of circumstances which singly or in combination render a jury unable to decide in [a] . . . rational manner." *Id.* The court adopted a balancing test, *id.* at 1084, but stated that it was adopting a "high standard" that would allow denials of jury trials "only in exceptional cases." *Id.* at 1088. The case before this court is not such a case.

The third circuit developed a standard with three factors for the district courts to consider in determining when a jury trial would violate due process. The district courts are to make an objective evaluation by examining:

> first, the overall size of the suit, the primary indicia of which are the estimated length of trial, the amount of evidence to be introduced and the number of issues that will require individual consideration; second, the conceptual difficulties in the legal issues and the factual predicates to these issues, which are likely to be reflected in the amount of expert testimony to be submitted and the probable length and detail of jury instructions; and third, the difficulty of segregating distinct aspects of the case, as indicated by the number of separately disputed issues related to single transactions or items of proof.

Id. at 1088-89.

Applying the standard to the case at hand, I find that this case is not one in which due process mandates that it not be tried to a jury. The overall size of the suit was not exceptionally great. The trial lasted less than two weeks, a time span that would not be unduly burden-

some for a jury. Although the testimony was frequently technical, it was not any more technical than a typical patent case and surely the standard was not to be applied to preclude jury trial in all patent cases. Furthermore, the case involved only two plaintiffs and one defendant, thus minimizing the conceptual difficulties in understanding the factual and legal issues involved. Consequently, even though twenty-two interrogatories were propounded to the jury, they did not have to segregate distinct aspects of the evidence for application to some parties, but not to others.

Although there is arguably some indication from the inconsistencies in the answers to interrogatories that this particular jury may have been confused, I do not find that trial by jury would necessarily deprive defendant of due process. Therefore, should a new trial be necessary, plaintiff would still be entitled to a jury trial.

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

QUAKER CITY GEAR WORKS, INC. and KARLHEINZ ROTH, *plaintiffs*	:	CIVIL ACTION
vs.	:	
SKIL CORPORATION, *defendant*	:	No. 79-2287

ORDER

AND NOW, this 21st day of September, 1983, for the reasons set forth in the accompanying memorandum, IT IS ORDERED that judgment will be entered in favor of defendant Skil Corporation and against plaintiffs Quaker City Gear Works, Inc. and Karlheinz Roth.

BY THE COURT:

_____

CLIFFORD SCOTT GREEN, *J.*

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

QUAKER CITY GEAR WORKS, INC. ROTH, KARLHEINZ	:	CIVIL ACTION
vs.	:	
SKIL CORPORATION	:	No. 79-2287

ORDER

AND NOW, this 25th day of October, 1983, upon consideration of plaintiff's motion to amend the judgment rendered September 21, 1983, defendant's response thereto and plaintiff's reply memorandum, it appears that plaintiff has not raised any issues which were not considered by the court and discussed in the memorandum of September 21, 1983. Accordingly, IT IS ORDERED that plaintiff's motion is DENIED.

BY THE COURT:

CLIFFORD SCOTT GREEN, *J.*

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

QUAKER CITY GEAR WORKS, INC. and KARLHEINZ ROTH, *Plaintiffs*	:	Civil Action No. 79-2287
v.	:	Judge Green
SKIL CORPORATION, *Defendant*	:	

NOTICE OF APPEAL

QUAKER CITY GEAR WORKS, INC. and KARLHEINZ ROTH, plaintiffs in the above-entitled case, hereby appeal to the United States Court of Appeals for the Federal Circuit from the judgment entered herein and the denial of the Motion to Amend Judgment dated October 26, 1983.

QUAKER CITY GEAR
WORKS, INC.
and KARLHEINZ ROTH

By_____
John W. Logan, Jr.
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Dated: November 14, 1983

Court of Appeals, Federal Circuit

Quaker City Gear Works, Inc. et al.
v. Skil Corporation

Nos. 84-634 and 84-649

Decided Nov. 9, 1984

Before Bennett and Nies, Circuit Judges, and Cowen, Senior Circuit Judge.

Nies, Circuit Judge.

Appeal 84-634 is from the judgment of the United States District Court for the Eastern District of Pennsylvania (Green, J.), entered September 21, 1983, holding invalid U.S. Patent No. 3,247,736, owned by Quaker City Gear Works, Inc. The case was tried to a jury, which returned a special verdict under Rule 49(a), Fed. R. Civ. P., responding to a series of factual and legal questions tending to uphold Quaker City's position that its patent was valid and infringed. The district court, however, directed entry of judgment for Skil Corporation on the basis that the '736 patent failed to comply with the disclosure requirements of §112 by incorporating by reference "essential material" from an unavailable publication, German Industrial Standard 58400 (draft September 1963). We conclude that this action was correct.

In Appeal No. 84-649, Skil asks for attorney fees under 35 U.S.C. §285. We are unconvinced that the record provides a basis for finding the case to be "exceptional", as required for an award of attorney fees.

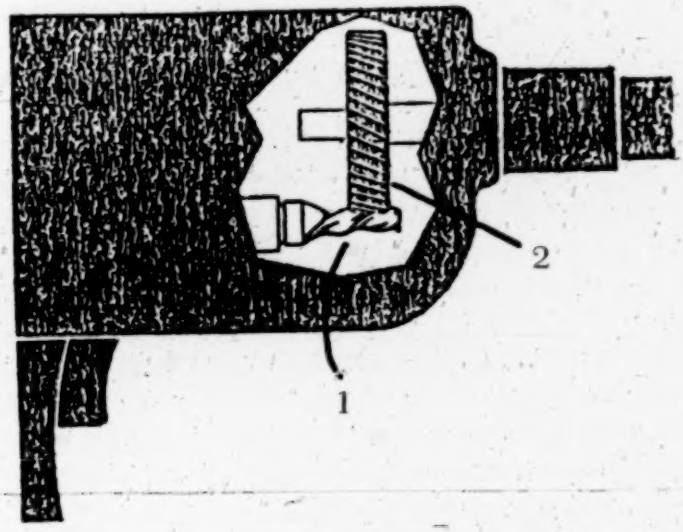
Accordingly, the judgment is affirmed.

Background

1. The Patent

The patent in suit, entitled "Involute Gear Combinations" and issued April 26, 1966 to Karlheinz Roth, relates to a speed-reduction gear train for the transmis-

sion of power in which a pinion with a relatively small number of teeth meshes and drives a parallel gear with a relatively large number of teeth.[1] The invention can be applied in the gearing mechanism for a hand-held power drill, as illustrated below:



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1. Exemplary claim 1 reads as follows:

1. A combination of involute gears in which the shafts of the two gears are parallel to one another and wherein the virtual number of teeth on the pinion is no more than five, comprising the following features:

(a) Both gears are helical and the helix angle is given by

$$-0.35z_v + 1.4 < \frac{b}{m_n} \sin \beta_o < 1.5$$

wherein B_o = helix angle at the pitch cylinder, m_n = module, b = minimum tooth width and z_v = virtual number of teeth;

(b) the pinion has a small addendum and a large useful dedendum (difference between useful height of tooth and addendum) if it is the driver, or a large addendum and a small useful dedendum if it is the driven, the profiles of the combination being complementary in respect of the tooth sides involved in power transmission;

(c) there is a profile deviation which is positive for the pinion in a step-down combination but negative in a step-up combination, and positive for the wheel in a step-up combination.

The pinion, or drive gear, labelled 1 in the above figure, has helical teeth which mesh with, and transmit power to, a second helical gear with many more teeth (the "wheel"), labelled 2. The gear curvatures are designed so that the number of teeth on the pinion is kept to a minimum, resulting in gear ratios obtainable in a single gear stage that were previously attainable only in multiple gear stages. The invention is advantageous in substantially lowering the cost of the gear train required for a given speed-reduction ratio.

The patent specification discloses both a single tooth and a double tooth pinion as embodiments of the invention. The specification teaches that, to practice the invention, the disclosed pinion is "preferrably combined" with a helical wheel gear made according to "German Industrial Standard 58400 draft September 1963." The standard, in fact, is mentioned at six locations in the specification as follows:

> Further, in a step-down involute gear combination according to the invention it is preferred to use as the basic profile for the wheel the standard profile for precision work as laid down by German Industrial Standard No. 58400 (draft September 1963).
>
> * * *
>
> The mating profile can be a standard profile, preferably according to German Industrial Standard 58400 draft September 1963 for the precision industry.* * *
>
> The standard profile for the precision industry according to German Industrial Standard No. 58400 is complementary to the basic profile of FIG. 1. * * * Thus, in the case of the standard profile according to German Industrial Standard 58400 draft September 1963, a portion of the dedendum available for power

transmission is not used in the gear combination in question.

* * *

The pinion of FIG. 4 can likewise be combined with a helical gear made according to German Industrial Standard 58400 draft September 1963. The basic profile of FIG. 2 is also complementary to the profile of German Standard 58400 draft September 1963. [Emphasis added.]

The standard is also claimed in dependent claim 5, a claim not in issue in the present litigation.

2. *The Patent Prosecution*

The Roth application was filed in the U.S. Patent and Trademark Office (PTO) on December 12, 1963. Although the patent issued with a claim for priority based on a German application, filed January 17, 1963, there are significant differences between the two applications, and Quaker City no longer relies on the earlier date.

The U.S. application received a first action allowance by the PTO examiner, with no questions raised as to the six references in the specification to the 58400 German Standard, despite the fact that the Standard was claimed in claim 5.

The Office Action allowing the application was sent to Roth's German patent agent by the U.S. patent attorney handling the prosecution. In a letter dated June 22, 1965, acknowledging receipt of the Office Action, the German patent agent wrote the U.S. attorney, querying:

In the English documents of the application, reference is made on several pages and also in claim 5 to the DIN Standard (German Industrial Standard) 58400 and also (on page 6, 1) to DIN 867. We ask you to check whether this reference to German

standards can be retained or whether it is necessary to carry out a substitution by American standards or by a literal description before the granting.

The U.S. attorney responded:

In connection with the reference to the German Industrial Standards appearing in the specification and Claim 5, *assuming that these Standards are available to the public in printed form*, we see no reason why it would be necessary to replace them in the specification by a reference to a corresponding United States Industrial Standard or by a more complete structural description. With respect to the use of this terminology in Claim 5, the situation is not quite so clear, but in our opinion, we believe that claim should be allowed to remain in its original form. We must point out that the use of this type of terminology in a claim is quite irregular by U.S. claim writing standards, and we are somewhat surprised that the Examiner did not object thereto. However, it is also true that some U.S. Examiners will allow considerable latitude in claiming an invention providing that the way in which the invention is claimed is not clearly contrary to established procedures. We believe that the Examiner could find no concrete reason for objecting to Claim 5 and, thus, he is prepared to allow it in its present form. *While we would have preferred to write a more exact description of the structure involved*, in view of the fact that the claim has been allowed and the Examiner has closed out prosecution on merits and, further, in view of the fact that Claim 5 is a dependent claim, we would suggest that this claim be allowed to remain as it presently is. We would suggest, however, that in any future cases where a similar situation is present that a more complete structural definition of the invention be given, particularly in the claims. We think that the present application in-

volves a unique situation in which the Examiner has gone much farther than is customary in allowing us to claim the invention in this fashion, and we think that it would be highly-doubtful that this would be repeated in another case. [Emphasis added.]

The U.S. application was thus issued without a description of the German Standard or a reference to any corresponding U.S. Standard.

3. District Court Proceedings

Quaker City instituted a patent infringement suit against Skil in the United States District Court for the Eastern District of Pennsylvania. Despite repeated discovery requests by Skil, Quaker City was unable to produce a copy of the referenced September 1963 draft of German Industrial Standard 58400.

The case was tried to a seven member jury over a two week period. The jury heard conflicting testimony concerning, inter alia, the adequacy of the patent disclosure to enable one of ordinary skill in the art to make and use the invention under 35 U.S.C. §112, first paragraph.[2] At one point, while being questioned on the related German priority application, the inventor, Roth, testified that the referenced German Standard was "necessary" to design the wheel of the invention.

At the conclusion of the trial, the jury was asked to return a special verdict in the form of answers to 22 interrogatories. In accordance with Judge Green's instructions, the jury did not answer questions on which they

2. 35 U.S.C. § 112 provides, in pertinent part:

The specification shall contain a written description of the invention, and of the manner shall contain a written description of the invention, and of the man and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

could not unanimously agree. The jury found that the scope and content of the prior art did not include any of nine references put into evidence by defendant, that the references were not more pertinent than art considered by the examiner, that the invention would not have been obvious from various combinations of the above references, that the patentee did not withhold pertinent prior art, that the claims distinctly claimed the invention, did not cover inoperable combinations of gears, did not attempt to patent a mathematical expression or merely a desired result, did cover an arbitrary range, and did not contain an incorrect formula. Finally, the jury found that Skil willfully infringed. The jury could not agree on whether the person of ordinary skill in the art had a high school or college education.

With respect to enablement, the specific interrogatories, and the answers provided by the jury, read as follows:

Interrogatory #11

> Does the specification of the Roth patent, that is, the portion of the patent in Columns 1, 2, 3, 4 and the first four lines of Column 5, contain a written description, including its drawings and text, *of the alleged invention* in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is more nearly connected, to make and use the same?
>
> Yes X ____

Interrogatory #12

> Does the specification of the Roth patent, that is, the portion of the patent in Columns 1, 2, 3, 4 and the first four lines of Column 5, contain a written description, including its drawing and text, *of the manner and process for making and using the alleged invention* in such full, clear, concise and exact

terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same?

Yes X ___

As indicated directly above, the jury could not agree on an answer to Interrogatory No. 12.

The jury's answers were recorded and the jury was released, subject to later recall, after which the parties were given the opportunity to file relevant motions. Quaker City moved for entry of an order in its favor on liability and for a trial with respect to damages. Skil moved for judgment in its favor under Rule 50(b), Fed. R. Civ. P.,[3] or for a new trial.

The district court granted Skil's motion solely on the basis that the patent was invalid for failing to comply with the disclosure requirements of 35 U.S.C. §112. The court based its decision on its finding that the German Standard constituted "essential material," noting, "No interrogatory was requested or submitted to the jury con-

3. Rule 50(b) provides:

(b) *Motion for Judgment Notwithstanding the Verdict.* Whenever a motion for a directed verdict made at the close of all the evidence is denied or for any reason is not granted, the court is deemed to have submitted the action to the jury subject to a later determination of the legal questions raised by the motion. Not later than 10 days after entry of judgment, a party who has moved for a directed verdict may move to have the verdict and any judgment entered thereon set aside and to have judgment entered in accordance with his motion for a directed verdict; or if a verdict was not returned such party, within 10 days after the jury has been discharged, may move for judgment in accordance with his motion for a directed verdict. A motion for a new trial may be joined with this motion, or a new trial may be prayed for in the alternative. If a verdict was returned the court may allow the judgment to stand or may reopen the judgment and either order a new trial or direct the entry of judgment as if the requested verdict had been directed. If no verdict was returned the court may direct the entry of judgment as if the requested verdict had been directed or may order a new trial.

cerning whether the German Standard was essential material," and that, therefore, under Rule 49(a), Fed. R. Civ. P.,[4] the court was free to make that finding. In making its determination the court stated:

> In light of all the evidence, particularly Prof. Roth's testimony that the German Standard was "necessary" to design the wheel used in a related German patent, I find that the German Standard was "essential material" for the design of the Patent at issue here as well.

The court then held that, under the guidelines set forth in General Electric Co. v. Brenner, 407 F.2d 1258, 1262, 159 USPQ 335, 338 (D.C. Cir. 1968) and the Manual of Patent Examining Procedure, §608.01(p)(B), reference to an unavailable non-patent foreign publication was clearly insufficient for compliance with §112.

The court ruled in the alternative that Skil was not entitled to relief on the ground that the jury's answers were inconsistent, although the court did note that "the

4. Rule 49(a) provides:

(a) *Special Verdicts.* The court may require a jury to return only a special verdict in the form of a special written finding upon each issue of fact. In that event the court may submit to the jury written questions susceptible of categorical or other brief answer or may submit written forms of the several special findings which might properly be made under the pleadings and evidence; or it may use such other method of submitting the issues and requiring the written findings thereon as it deems most appropriate. The court shall give to the jury such explanation and instruction concerning the matter thus submitted as may be necessary to enable the jury to make its findings upon each issue. If in so doing the court omits any issue of fact raised by the pleadings or by the evidence, each party waives his right to a trial by jury of the issue so omitted unless before the jury retires he demands its submission to the jury. *As to an issue omitted without such demand the court may make a finding;* or, if it fails to do so, it shall be deemed to have made a finding in accord with the judgment on the special verdict. [Emphasis added.]

jury's answers do not appear entirely consistent" and that "[m]ost notably, the jury's failure to find that any of the references listed in Interrogatory #1 were prior art seems inconsistent with the evidence of both parties." The court was also not concerned over the jury's failure to agree on an answer to Interrogatory #12, since in the court's view, "when one reviews the jury's answers to the twenty-two interrogatories as a whole, they are sufficiently consistent to indicate the jury's intent to return a verdict for the plaintiff." Finally, with respect to Skil's complaint that the technical nature of the evidence was beyond the jury's ability to understand, and that, therefore, under In re Japanese Electronic Products Antitrust Lit., 631 F.2d 1069 (3rd Cir. 1980), the case should not have been tried before a jury, Judge Green ruled that the subject matter was no more technical than a typical patent case, and that Skil has not been deprived of due process.

Quaker City subsequently filed a motion asking that the judgment be vacated, which was denied by Judge Green on the basis that the motion raised no issues that had not previously been considered.

With respect to Skil's request for attorney fees, which it made in its pleadings and its post-trial proposed conclusions of law, no specific ruling was made on the matter. The judgment simply contains no award.

Opinion

I.

When a special verdict is sought from a jury, the appropriate procedure is for the court to accept the findings of fact explicitly made or implicit in the jury's answers and based thereon and on such additional findings as the court may find necessary to make (Rule 49(a)), direct entry of judgment under Rule 58, Fed. R.Civ.P. In this case, there was some uncertainty concerning how to deal with the jury's special verdict even though it was

largely in Quaker City's favor, because all of the questions were not answered and because some of the answers, particularly the answer to Interrogatory 1 rejecting all proffered references from consideration as prior art, indicated a lack of comprehension of the issues. Because of its uncertain status as a "verdict",[5] Skil filed a motion for judgment under Rule 50(b) purportedly on the theory that "no verdict was returned." See Rule 50(b), supra note 3, last sentence. The court, however, termed and treated this motion as a 50(b) motion for judgment notwithstanding the verdict.

As an initial matter, with respect to terminology, Rule 49(a) speaks of "a special verdict in the form of a special written finding upon each of fact." Thus, the compilation of findings is "a special verdict." The rule contemplates that only factual questions will be submitted to the jury to which the judge will then apply the law, supplementing, in necessary, any factual determinations not submitted to the jury. 5A Moore's Federal Practice, §49.02, at 49-8 (2d ed. 1984). Where a special verdict does not contain one or more answers requested, it may, unless wholly defective, be accepted for those issues that are resolved. It is "a special verdict" to the extent findings are made (assuming the findings are not contradictory). Wright and Miller, Federal Practice and Procedure: Civil, §2510, at 520 (1971). A party may request reconsideration by the jury of unresolved factual issues in such case, or may be entitled to a retrial of those issues.[6] However, the right to trial by jury of any factual

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5. Adding to the uncertainty, the court specifically said there was no verdict, but merely answers to interrogatories. Undoubtedly, the court meant there was no general verdict for a party.

6. See Brown, Federal Special Verdicts: The Doubt Eliminator, 44 F.R.D. 338, 347-48 (1967) in which when C.J. Brown (5th Circuit) points out how a trial judge or an appellate court may save the "good" part of a first trial. See also Sunderland Verdicts, General and Special, 29 Yale L.J. 253 (1920); 5A Moore's Federal Practice, §49.02, at 49-6 (2d ed. 1984).

issue may be waived, for example, by that the jury need not answer all questions, and the court is empowered to complete the findings, apply the law, and direct entry of judgment. Thus, in this case, when the court determined that the answers given were reconcilable, the "special verdict" should have beem promptly recorded as such.

In any event, based on the answers, Quaker City correctly sought entry of a judgment in its favor as provided in Rule 58, Fed. F.Civ.P.[7] The answers, on the other hand, did not support Skil's position that the patent was invalid and not infringed. Therefore, Skil should have filed a Rule 50(b) motion for judgment notwithstanding *the verdict* since it wished to challenge the sufficiency of the evidence supporting the particular findings of the jury.

Finally, while "a specific verdict" seeks resolution of only *factual* issues under a precise reading of Rule 49(a), this court has not found error where a legal question has been included. Rather, since the answer to the legal question necessarily resolves any disputed underlying factual issues, we have undertaken to review the factual findings on which the legal conclusion is based, applying the substantial evidence standard. Connell v. Sears, Roebuck & Co., 722 F.2d 1542, 1550, 220 USPQ 193, 199 (Feb. Cir. 1983).

Turning to the action taken by the court here, we do not agree that the court was free to make a specific find-

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7. Rule 58 provides, in pertinent part:

Subject to the provisions of Rule 54(b): (1) upon a general verdict of a jury, or upon a decision by the court that a party shall recover only a sum certain or costs or that all relief shall be denied, the clerk, unless the court otherwise orders, shall forthwith prepare, sign, and enter the judgment without awaiting any direction by the court; (2) upon a decision by the court granting other relief, or upon a special verdict or a general verdict accompanied by answers to interrogatories, the court shall promptly approve the form of the judgment, and the clerk shall thereupon enter it.

ing under Rule 49(a) which *overruled* an implicit and inherent finding of the jury within a broader question. Rather, the court had to accept the jury's determination and could set it aside only if it were not supported by substantial evidence. However, this procedural irregularity did not affect the result here.

Inadequate Disclosure

The question of whether the disclosure of a patent satisfies the enablement requirement of §112, first paragraph, is a question of law. Raytheon Co. v. Roper Corp., 724 F.2d 951, 960, 220 USPQ 592, 599 n.6 (Feb. Cir. 1983). However, that issue may involve subsidiary questions of fact or of law. In this case, we are faced with both types of underlying questions. The first, whether the German Standard is necessary for an adequate disclosure, is a factual question; the second, whether it could be incorporated by reference, is a legal question.

Quaker City argues that the jury was aware of the argument and conflicting evidence over whether or not the unavailable German Standard was critical to enablement and presumably decided the matter in Quaker City's favor. Quaker City particularly points to the testimony of its witnesses, Drago and Berlinger, as providing the requisite "substantial evidence" in support of the answer.

Drago, a consultant for Quaker City in connection with gearing made in accordance with the Roth patent, testified as follows:

> Q. Mr. Drago, we've heard witnesses testify as to the inability to understand the Roth patent. Have you ever had any difficulty in understanding the Roth patent?
>
> A. No, sir.

Q. Have you ever had any difficulty in determining how to make a gear combination following the teachings of the Roth patent?

A. No, sir.

Q. Have you ever made any such combinations?

A. Yes.

Q. Well, let's change that. Have you ever designed any such combinations?

A. Yes.

Q. Have they been made?

A. Yes.

Berlinger, a mechanical engineer for Quaker City, testified to the following:

Q. Do you find in that patent a teaching of how to make a gear combination including a pinion and a gear?

A. Yes.

Q. Have you, by you, I mean you and Quaker City Gear Works, made gear combinations including a pinion and a gear in accordance with the teachings that you got from the Roth Patent?

A. Yes.

Q. Are the models of Exhibits 30, 31 and 32 made in accordance with the teaching of the Roth Patent?

* * *

THE WITNESS: Yes.

Quaker City's argument is that if the jury found the above testimony to be believable — and, according to Quaker City, the jury's answer to Interrogatory 11 indicates that it did — then the district court *must accept* the

jury's answer that the patent disclosure satisfies the requirements of 35 U.S.C. §112, first paragraph.[8]

[1] Under Quaker City's view, we could look *only* to evidence in its favor to determine whether "substantial evidence" supports the implicit factual finding that the German Standard was not "essential material." The law is clearly to the contrary.

In Connell v. Sears, 722 F.2d at 1546, 220 USPQ at 197, this court set forth the standard governing the granting or denial of a motion JNOV under Rule 50(b) as follows:

> To govern consideration of motions for a directed verdict and for judgment notwithstanding the verdict, guidelines consistent with the Seventh Amendment and the cited Rules have been set forth in the cases. [Citations omitted.]
>
> Under these guidelines, a court must: (1) *consider all the evidence;* (2) in a light most favorable to the non-mover; (3) drawing reasonable inferences favorable to the non-mover; (4) without determining credibility of witnesses, and (5) without substituting its choice for that of the jury between conflicting elements in the evidence. The court should not be guided by its view of which side has the better case or by what it would have done had it been serving on the jury. *If, after following those guidelines, the court is convinced upon the record before the jury that reasonable persons could not reach or could not have reached a verdict for the non-mover, it should grant the motion for directed verdict of for JNOV.* [Emphasis added.]

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8. We will assume that Interrogatory 11 is a complete determination with respect to §112 requirements, despite the failure of the jury to answer Interrogatory 12, which appears to be more precisely directed to enablement.

Cf. Universal Camera Corp. v. National Labor Relations Board, 340 U.S. 474 (1951). Thus, the substantial evidence standard requires a review of *all* of the evidence, in accordance with the above guidelines, in assessing whether the jury's presumed finding was reasonable.[9]

If we assume the jury wholly discredited the testimony of Skil's experts that the disclosure was not enabling, we must nevertheless, as the trial court did, take into account the admission by the inventor Roth that German Standard 58400 was necessary to design the wheel. Quaker City attempts to discount this admission on the basis that Roth was being interrogated on the corresponding German application, rather than the U.S. patent application. Skil counters with the explanation that the German application was used only as means for facilitating the cross-examination of Roth, which it contends was cumbersome at best, since it had to be conducted through a translator. Quaker City additionally discounts Roth's admission because he did not specifically refer to the "September 1963 draft." However, without question, Roth admitted that some standard was necessary, and the patent itself specifically identifies that material as a particular draft. In sum, Roth's testimony concerning the necessity of the standard negates the reasonableness of a conclusion that the standard was not essential for an adequate disclosure.

Quaker City's next set of contentions is that "all data of any significance from DIN 58400 are reproduced directly in the U.S. patent in suit," and that, in any event, the "well established German standards specifications closely parallel and are nearly identical to their U.S. counterpart," i.e., AGMA specification, 207.06, entitled "AGMA Standard System Tooth Proportions for Fine-Pitch Involute Spur and Helical Gear." Both these arguments must fail since the unavailability of the Sep-

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9. See Cooper, Directions for Directed Verdicts: A Compass for the Courts, 55 Minn. L. R. 903, 927-953 (1971).

tember 1963 DIN 58400 draft makes it impossible to confirm the assertions. Moreover, the concern expressed in the correspondence between Quaker City's German patent agent and U.S. attorney in 1965 convincingly negates Quaker City's position that the information is incorporated in the patent.

Finally, Quaker City challenges the district court's purported holding that "essential material" in a foreign document may not be incorporated by reference. Judge Green did note that the Manual of Patent Examining Procedure §608.01(p)(B) restricts the incorporation by reference of "essential material" to that found in (1) a U.S. patent or (2) an allowed U.S. patent application.[10]

Quaker City's argument is that the above referenced section was added to the MPEP *after* the pendency period of the Roth patent application. Skil's counter argument is that 35 U.S.C. §112, first paragraph, has always required an adequate disclosure.

[2] The restriction on incorporation by reference set forth in §608.01(p)(B) is immaterial to resolution of a case such as the present one, where an *unavailable* reference has been incorporated by reference. Incorporation by reference has never been permissible under 35 U.S.C. §112 of material necessary for an adequate disclosure which is unavailable to the public.

Since we affirm the judgment on the basis of lack of enablement, we will not address in detail the other grounds of invalidity raised by Skil. However, a number of errors appear from our review of the record. The court's instruction on a weaker or stronger presumption of validity and a different burden of proof depending on whether the PTO reviewed the best prior art is not in accordance with the precedent of this court. American Hoist & Derrick Co. v. Sowa & Sons, Inc., 725 F.2d 1350,

10. "Essential material" is defined as "that which is necessary to (1) support the claims, or (2) for adequate disclosure of the invention (35 U.S.C. §112)." M.P.E.P. §608.01(p)(B), at 600-35 (1983).

1360, 220 USPQ 763, 771 (Fed. Cir. 1984). The question of whether the cited references were prior art should not have been submitted to the jury nor instructions given, since it was undisputed that they were. Structural Rubber Products Co. v. Park Rubber Co., No. 83-1326, slip op. at 20 (Fed. Cir. Nov. 9, 1984); Nestier Corp. v. Menasha Corp.-Lewisystems Div, 739 F.2d 1576, 1579, 222 USPO 747, 750 (Fed. Cir. 1984). Further, the court's instruction on obviousness sugests that the jury should decide whether a person of ordinary skill would actually know of the prior art references, a clear error of law. Kimberly-Clark Corp. v. Johnson & Johnson and Personal Products Co., 223 USPQ 603, 610-14 (Fed. Cir. 1984). Understandably, the jury could have concluded that one ordinary skill in the art would be ignorant of references written in German and Japanese.

Finally, the court stated that it was using Rule 49(a) to resolve factual issues only, apparently believing that the legal issues of enabiement and obviousness were issues of fact. While it is not error to submit these issues to the jury if the trial judge wishes to do so, the instructions must identify in some clear manner what underlying factual issues the jury is expected to resolve. See Structural Rubber, slip op. at 28-32; Moore's, supra, §49.03[3] at 49-20 to 49-22.

II.

Attorney Fees

The basis for Skil's argument that this case is "exceptional" within the meaning of 35 U.S.C. §285 is that Quaker City breached its duty of candor to the U.S. Patent and Trademark Office by failing to disclose certain publications (the 1956 AGMA Standard 207.4 and the 1961 Thoen paper) to the examiner. While lack of candor or "fraud" can form a basis for an "exceptional case," we note that the jury, in answering Interrogatory #5, specifically found that Quaker City had *not intentionally*

failed to call these references to the attention of the U.S. Patent and Trademark Office. The difficulty with relying on this answer is that the jury erroneously held the references not to be prior art at all in Interrogatory No. 1.[11] In any event, in the interests of judicial economy, we have considered the record as a whole and ascertain no basis that would justify an award of attorney fees. Accordingly, we do not remand for the trial court to reconsider this matter.

Conclusion

In Appeal No. 84-634, we conclude the district court correctly granted Skil's motion for JNOV. In Appeal No. 84-649, we conclude that Skil is not entitled to attorney fees. Accordingly, the judgment is *affirmed.*
Affirmed.

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11. While a jury's fact findings common to a legal claim and an equitable defense are to be accepted by the court in ruling on the equitable matter, Beacon Theatres v. Westover, 359 U.S. 500, 508 (1958), resolution by the jury of equitable issues is questioned. See In re Yarn Processing Patent Validity Litigation, 472 F.Supp. 170, 173, 205 USPQ 758, 761 (S.D. Fla. (1979) (no right to jury trial on wholly equitable issues).

United States Court of Appeals for the Federal Circuit

QUAKER CITY GEAR WORKS, INC. and KARLHEINZ ROTH, *Appellants*,	:	No. 84-634 84-649
v.	:	
SKIL CORPORATION, *Appellee*.	:	

ORDER

A petition for rehearing and a suggestion for rehearing in banc having been filed in this case,

UPON CONSIDERATION THEREOF, it is Ordered by the court that the petition for rehearing be, and the same is hereby, Denied.

The suggestion for rehearing in banc is declined.

FOR THE COURT

George E. Hutchinson, Clerk

January 3, 1985
Date

cc: John W. Logan, Jr.
Clarence J. Fleming

FEDERAL REPUBLIC OF GERMANY
CERTIFICATION

The Siemens + Halske Aktiengesellschaft in Berlin and Munich has filed an application with the German Patent Office on January 17, 1963, for an invention patent under the title:

"Involute gear mating with a small number of teeth on the smaller gear".

The attached sheets are a correct and accurate reproduction of the original documents of this patent application.

Munich, November 4, 1963
The President of the German Patent Office
by: Wiedmann
Govt. Inspector in the German Pat. Off.

Document No: *S 83289 XII/47h*

Involute gear mating with a small number of teeth on the smaller gear

It is especially desirable for precision engineering to get along with small numbers of teeth on the gears. The production costs of a gear of given dimensions and given quality depend on the number of the individual teeth; the smaller the number of teeth, the lower the cost of the individual gear will be. If one decreases the number of the teeth on the smaller gear (pinion gear), then the number of teeth on the bigger gear is reduced to the same degree while maintaining the same gear ratio; thus, if instead of eight only two teeth are used for the pinion gear, then the number of teeth on the bigger gear is reduced by the factor of 4. A reduction in the number of teeth is, moreover, desirable in the case of a mating that is to provide a big step-down or step-up. Above all, for this type of application the reduction in the number

of teeth on the smaller gear leads to a further reduction in the overall structural size of the stage.

The invention concerns an involute gear mating with a pinion gear tooth number $Z1 \leq 5$. As is known, involute gears are preferred in transmission technology because they can be produced with straight-flanked tools and a change in the axial distance of the gears does not change the instantaneous transmission ratio, as is the case, e.g., with cycloidal and circular arc gear mating. As is known, the axes intersect in worm gear and helical gear mating. These gear systems are therefore not suitable for gearing designs with parallel axes, e.g., for those executed in *Platinenbauweise*. The transmission efficiency of a worm gear mating is usualy worse than the efficiency of an involute gear mating; a further disadvantage of the worm gear transmission is that a step-up is not possible. It is the problem of the invention to create an involute gear mating for parallel axes of the gears in which the number of teeth on the smaller gear (pinion) is so small that with the involute gearing matings according to the invention, transmissions can be realized in one stage which equal the possible transmissions of a worm drive without the strucutral size of the involute gear mating according to the invention fundamentally exceeding that of the worm drive. The gear mating of the invention is suitable for pinion gear tooth numbers under 5 and is characterized by the following features:

a) Such profiles are used for the smaller gear as have for the drive gear a small crown of tooth height and a big useful root of tooth depth, for the driven gear a big crown of tooth height and small useful root of tooth depth; the profiles of the tooth mating behave complementary to each other with reference to the flank involved in the power transmission.

b) A profile displacement is made such that for a gear mating for stepping down a rotary motion

the smaller gear (pinion) has a positive profile displacement, for a gear mating for stepping up, on the other hand, the smaller gear (pinion) has a negative profile displacement.

c) Crown shortening or root of tooth decrease and profile displacement are so adjusted to each other than the length of contact (with reference to the center line and with reference to the driving gear) for the most part lies on the side of the contact end.

d) The contact angle α_O is selected for a gear mating for stepping down of 15° to 25°, while for a gear mating for stepping up a contact angle of 25° to 35° is selected.

The invention is discussed with reference to the drawing in three embodiments.

Fig. 1 shows the reference profile of the normal section (rack profile) of a one-toothed pinion,

Fig. 2 shows the reference profile of the normal section (rack profile) of a two-toothed pinion,

Fig. 3 shows a one-toothed pinion in perspective,

Fig. 4 shows a two-toothed pinion in perspective,

Fig. 5 and Fig. 6 show the reference profile of two complementary profiles for stepping up,

Fig. 7 shows a gear mating for stepping up,

Fig. 8 shows an efficiency diagram of the transverse section for contact beginning and contact end.

In the profile of Fig. 1 the module m, as usual, is taken as a standard; all dimensions except for the degree designations are therefore to be multiplied with the moduie in mm. The line MM is so located that the tooth thickness = the space width = the half pitch $t_O/2$. The

pitch t_O amounts to 3.14159 module. The tooth crown is 0.25 module high, the root is 1.1 module deep; the tip clearance is 0.2 module.

A gear helical-toothed according to these measurements in the hob method is shown in Fig. 3. The tooth width is about 6 module, the angle of skew on the pitch cylinder $\beta_O = 15.2°$. The smallest angle of skew necessary for the *Ueberwachung* (monitoring, control, inspection??) is calculated according to the formula $\sin \beta = \pi m/2b$ (m = module, b = tooth width); in order to keep the axial force of the gears small, a small angle of skew is desirble; such a one also works out favorably on the flank shape of the gears in the production with gear hobbers.

The lead, i.e., the pitch circle arc between the two pitch cylinder generatrices through the points of intersection of a flank line with the two faces of the toothing, is so chosen that a ratio of lead ϵ of the mating of $\epsilon > 1$ results. As mating profile a standard profile can be used and with particularly good results the 58 400 for precision engineering; here, with a lead of a half pitch $t_O/2$ on a gear with 30 teeth and a spiral angle of $\beta_O = 15.2°$, a lead ration of $\epsilon = 1.1$ results.

Precision engineering standa.d profile 58400 behaves, with reference to the flanks involved in the power transmission, complementarily to the reference profile of Fig. 1, i.e., the pinion gear of Fig. 1 or 3 has a small crown and a large root, while the gear meshing with this pinion relative to parts involved in the power transmission has a large crown and a small root. Thus in standard profile 58400 a part of the flank of the root available for the power transmission in the gear mating in question is not utilized; this unused part can, however, be made useful if used with an additional gear. Of course, it is also possible to provide a reference profile that has a small root to begin with. Such a gear would have the advantage

of the somewhat greater solidity and the disadvantage that it can be mated only with the pinion gear as per Fig. 1 or 3.

The reference profile of Fig. 2 has a somewhat larger crown than that of Fig. 1, namely, of 0.4 module, and a somewhat greater tip clearance (root radius tooth fillet) of 0.3 module. The therewith associated pinion gear (Fig. 4) likewise has a lead of a half pitch $t_O/2$, the minimum tooth width being about 6 module; the spiral angle is 15.2°. The pinion of Fig. 4 can likewise be mated with a helical gear that is produced according to precision engineeering standard profile 58400. The reference profile of Fig. 2 is likewise a complementary profile to precision engineering standard profile 58400. It is possible, though a little less advantageous, to use a helical gear according to DIN 867 as mating gear.

Fig. 5 shows a reference profile for gearing for stepping up a rotary motion. In it, m designates the module, to the pitch $\alpha_O = 30°$, the pressure angle $S_K = 0.1$ m the tip clearance. The profile reference line MM, indicated by dash-dot line, is so located that tooth thickness and tooth space are equal. The point P marks the end of the driving flank of the rack profile. Fig. 6 shows a reference profile complementary to the reference profile of Fig. 5. The designations are the same as in Fig. 5.

A gear mating composed of helical gears corresponding to the reference profile of Figs. 5 and 6 is shown in Fig. 7. The smaller gear (pinion gear 1) has six teeth, while the gear 4 has 60 teeth. Of individual teeth of pinion gear 1 front surfaces 2 and back surfaces 3 are indicated, of individual teeth of the gear 4 front surfaces and back surfaces 6 are indicated. The ratio of lead of a *Schichtelement* (layer/coating element?) is 0.7, taking into consideration the ratio of lead, the entire overlap amounts to 1.2. The direction of rotation of the gears 1 and 4 is indicated by the arrows 7 and 8; this results in a stepping-up of a rotary motion.

The length of contact E1, E2, E3 lies, with reference to the line M1, M2 for the greater part on the right side, i.e., on the side of the contact end. At the beginning of the tooth contact (shock friction) the teeth surfaces still rub only a little on each other, since the point E1 lies close to the center line M1, M2, while at the contact end (pulling friction), at point E3 the stronger sliding of the tooth surfaces on each other does less damage. In Fig. 8, the instantaneous degree of efficiency η over friction value μ for a normal straight gear mating and for a *Schichtelement* of the gear mating according to the invention is shown. Although the number of teeth of the gear mating produced according to the invention is smaller, the efficiency for the transmission is better. The curve paths z1/z2 = 60/6 are valid for a *Schichtelement* of the gear mating of the invention according to Fig. 7, the curve parts z1/z2 = 80/8 are valid for a normal straight gear mating with 80 and 8 teeth respectively. The curve paths for the contact beginning are solid, while the curves for the contact endings are dashed. As can be seen from the representation, the curve paths for the gear mating of the invention according to Fig. 7 (are) closer together than in any previous normal gear mating; above all, the decrease in the degree of efficiency under increasing friction value is not so great with reference to the contact beginning and is always far above zero. This represents a great advantage because a jamming of the gears at the beginning of contact in the embodiment of the invention does not occur even with friction value μ = 1.0. It is shown, therefor, that the gearing of the invention is especially suitable for overcoming difficult operating conditions under which the friction value is especially high as a result of infrequent maintenance of the gearing or because of the presence of sand or dust in the atmosphere. Valid here also are the diagrams for a *Schichtelement* of the frontal section (*Stirnschnitt*).

Claims

1. Involute gear mating for pinion tooth numbers z = 5, characterized by the combination of the following characteristics:

   a) Such profiles are used for the smaller gear as have for the drive gear a small crown of tooth height and a big useful root of tooth depth, for the driven gear a big crown of tooth height and small useful root of tooth depth; the profiles of the tooth mating behave complementary to each other with reference to the flank involved in the power transmission.

   b) A profile displacement is made such that for a gear mating for stepping down a rotary motion the smaller gear (pinion) has a positive profile displacement, for a gear mating for a stepping up, on the other hand, the smaller gear (pinion) has a negative profile displacement.

   c) Crown shortening or root of tooth decrease and profile displacement are so adjusted to each other that the length of contact (with reference to the center line and with reference to the driving gear) for the most part lies on the side of the contract ending.

   d) The contact angel α_O is selected for a gear mating for stepping down of 15° to 25°, while for a gear mating for stepping up a contact angle of 25° to 35° is selected.

2. Gear mating as described in Claim 1 for pinion tooth numbers under 3, characterized by the fact that the overlap ratio of a *Schichtebene* (layer plane??) of the gear mating is selected to be under 1 and a overlap ratio of the total mating

greater than 1 is obtained by using a helical gearing.

3. Gear mating as described in Claim 1 or 2 for stepping down a rotary motion, characterized by the fact that the standard precision engineering profile 58400 is used as reference profile.

Fig.1

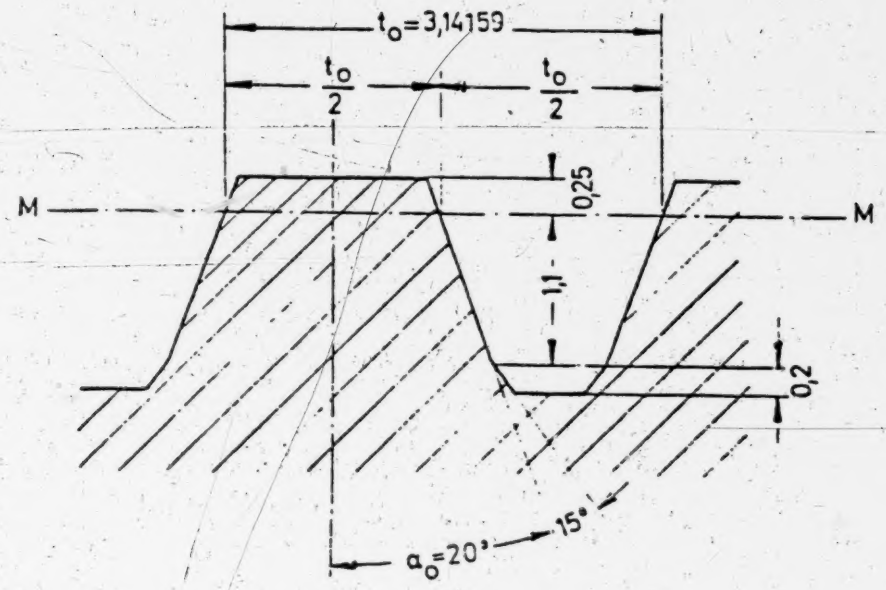
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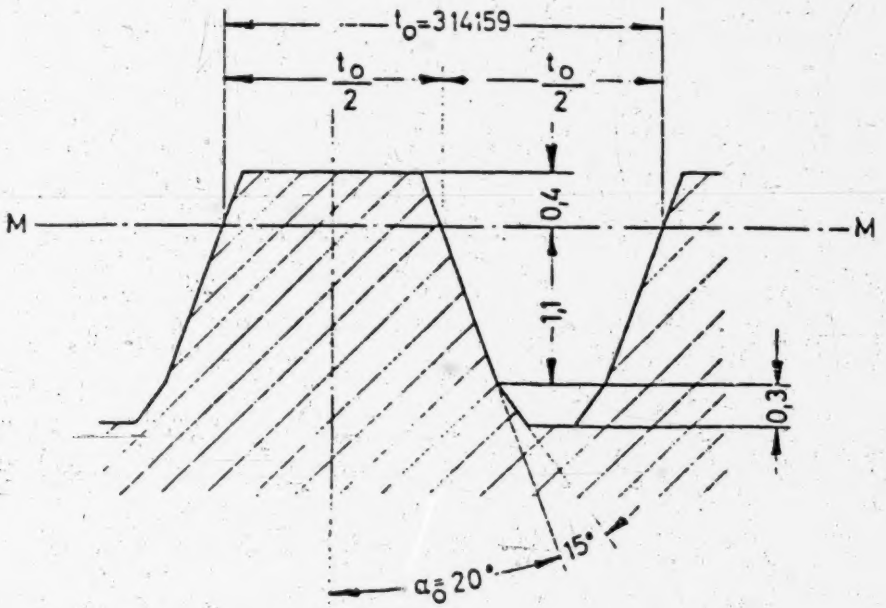
Fig.2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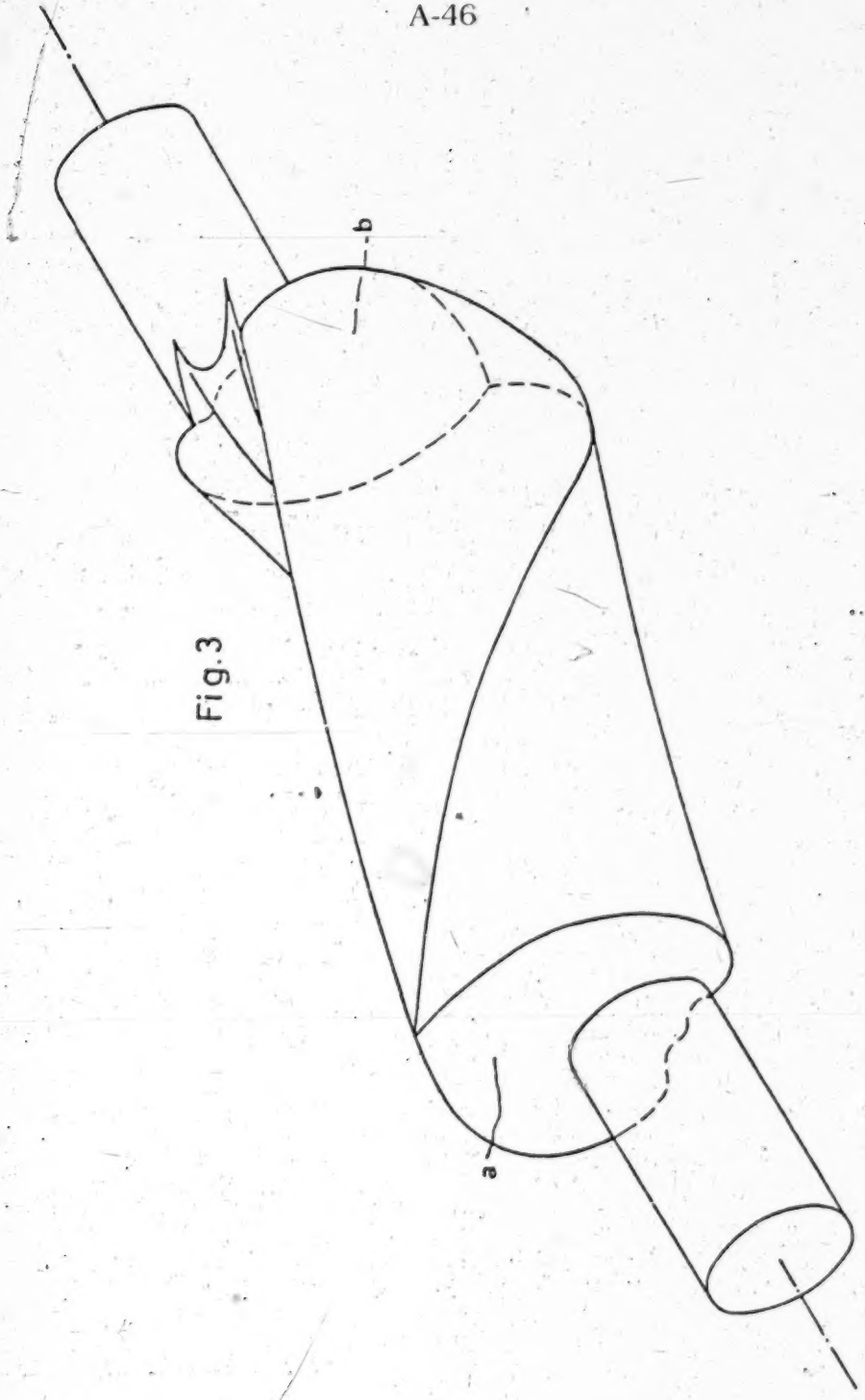


Fig.3

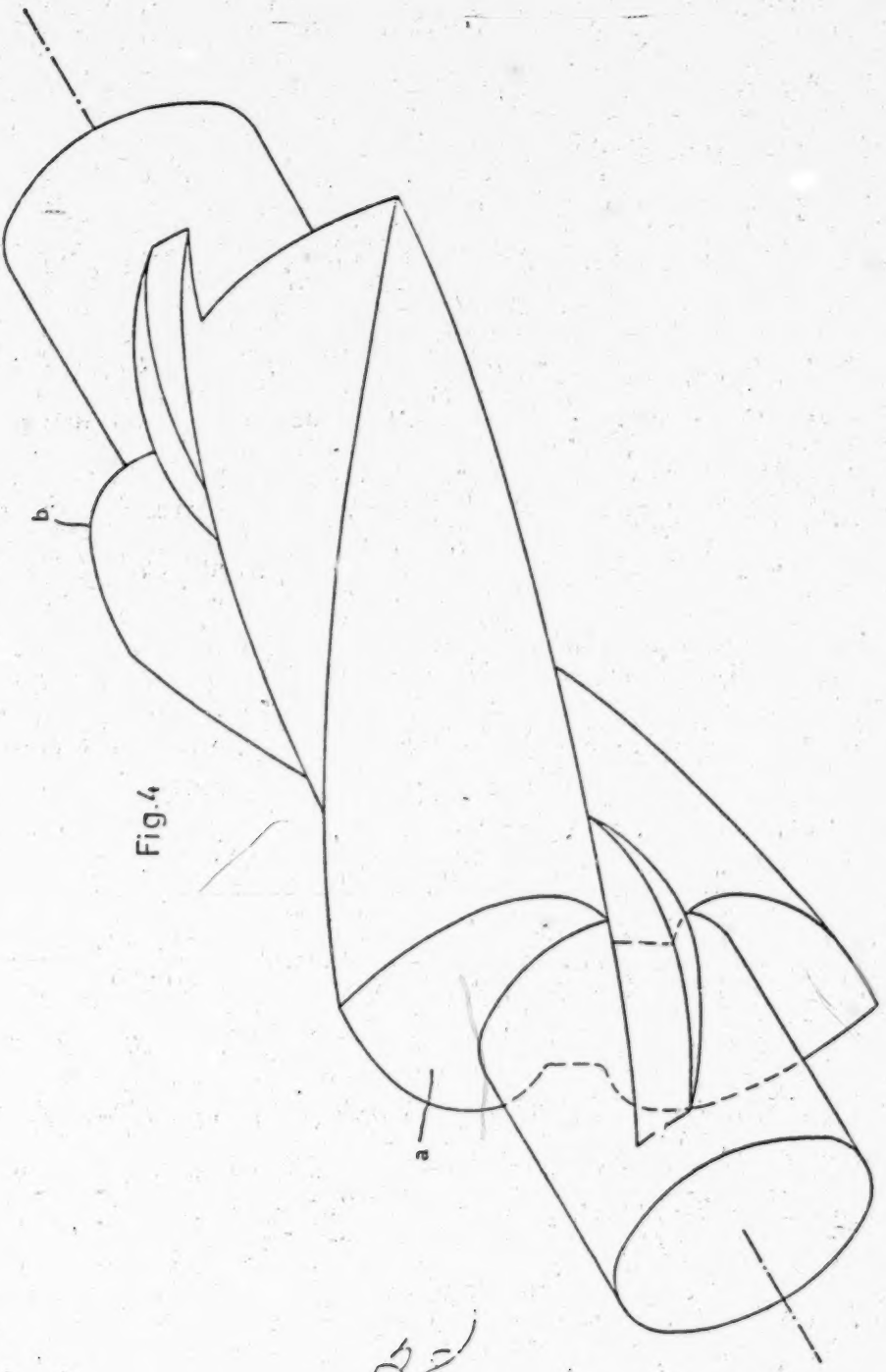
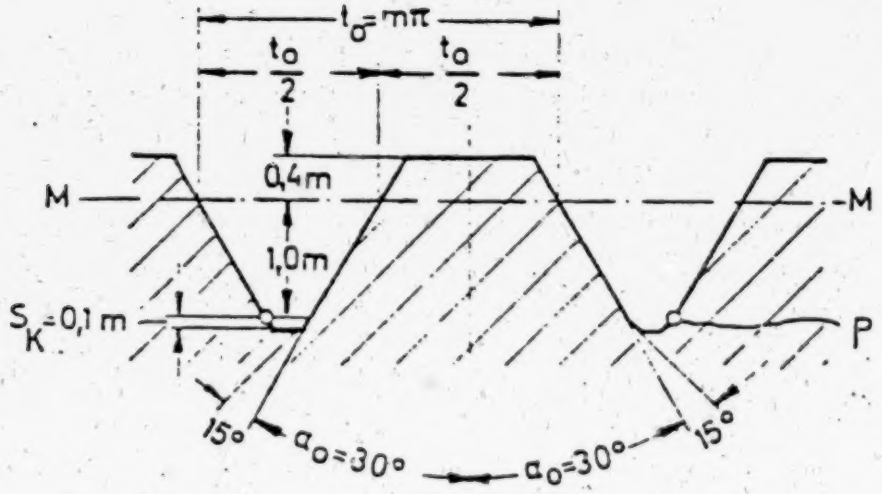


Fig.4

22

Fig.5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a_o=30°
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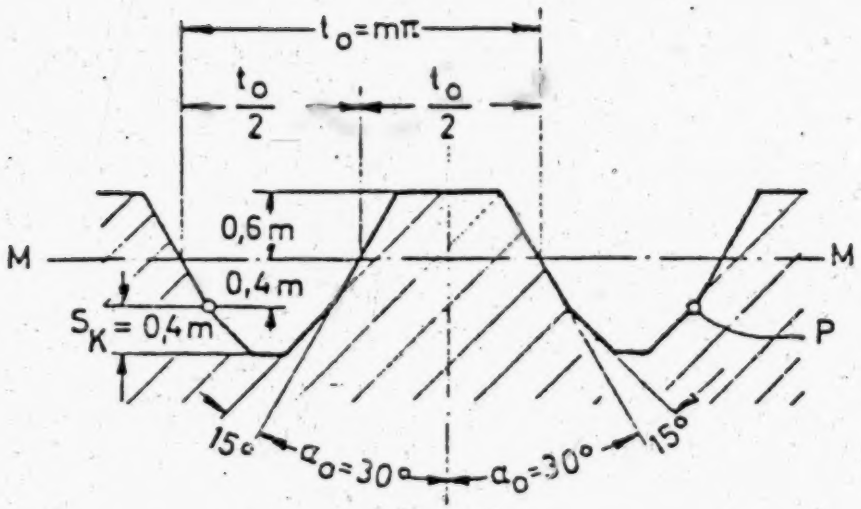
15°

Fig.6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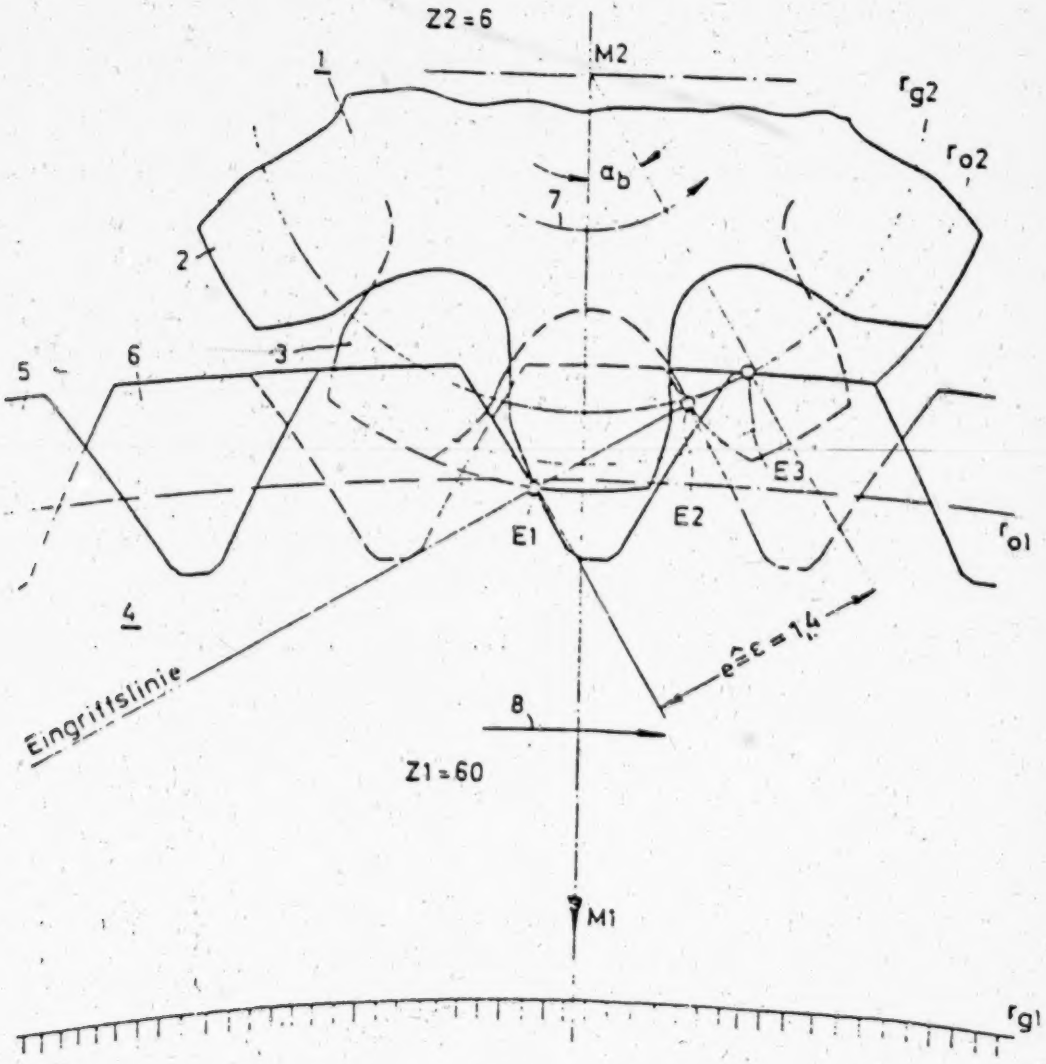
a_o=30°
a_o=30°
15°

Fig.7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α_b
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2
3
5
6
E3
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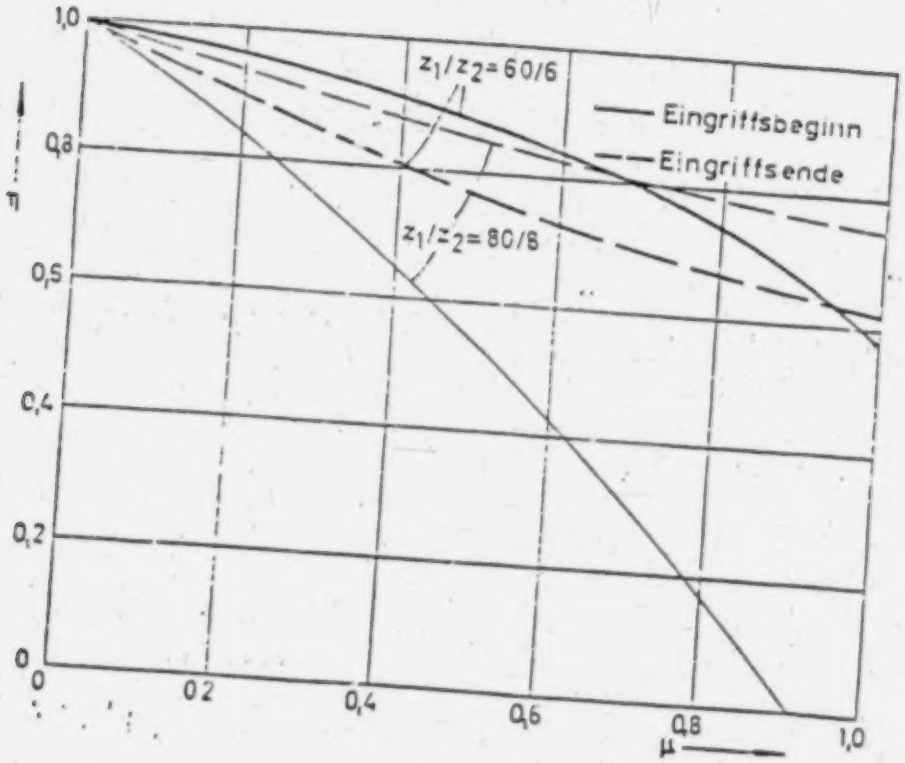
8
Z1 = 60
M1
r_{g1}

Fig.8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z1/z2=60/6
z1/z2=80/8
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BERLINGER DIRECT — called as a witness by Quaker City

Q. What is the business at Quaker City Gear Works?

A. Quaker manufactures custom precision gearing for small gearing, probably a quarter of an inch in diameter, up to about 39 inches in diameter and also gear reduction boxes.

Q. How long have you been employed by Quaker City Gear Works?

A. Since 1961, March.

Q. Could you trace your positions with Quaker City Gear Works from March of 1961 to the present?

A. Certainly. In March of 1961, I started in the shop by learning how to set up and run gear cutting machinery.

Q. Now, this was shortly after you graduated from college?

A. That is correct, it was. From there I moved into the Engineering Department for a few years, moved into the sales function of the company and did quite a bit of sales work in the latter part of the sixties and became General Manager in 1968 and President in 1971.

Q. What type of work did you do while you were in the Engineering Department?

A. I made many of the gear calculations that are necessary to properly manufacture and inspect gearing of various types.

Q. Did you do any design work?

A. Yes, I did.

Q. What type of design work did you do while you were in the Engineering Department at Quaker?

A. We occasionally would get a requirement from a customer to design and build the gear reduction system, which would be, let's say, several gears connected together to achieve a certain purpose. The stree levels of the gearing, the loads on the bearings had to be calculated. The sizes and dimensions of those gears had to be

calculated and the manufacturing processes had to be written and then manufactured in the shop.

Q. Is that the type of work that you did?

A. Yes, it is.

Q. Did you stop all engineering work after you got out of the Engineering Department of Quaker?

A. No, I didn't. I continued my engineering involvement to some extent, although not as great an extent after I got involved in sales and management of the company.

Q. To what technical societies do you belong?

A. The one I belong to is the American Gear Manufacturers Association, commonly known as AGMA.

Q. And what is AGMA?

A. AGMA is the American Gear Manufacturers Association, a group of individuals and companies in America with some foreign members whose major purpose it is to develop and devise gearing standards and to promulgate those standards throughout the industry in America.

Q. What positions have you held with the AGMA?

A. Excuse me. I participated in the Marketing Council, the International Advisory Council. I was the Chairman of the Fine Pitch Gearing Committee of AGMA for five years and I am presently on the Board of Directors of that group.

Q. What technical papers, if any, have you presented?

A. I have presented two technical papers.

Q. And what was the subject matter of them?

A. The subject matter was the Engineering End Uses, the Engineering End Uses of the Roth Invention.

Q. When and where were they presented?

A. The first paper was presented in 1975 to the American Gear Manufacturers Association in Montreal and dealt with the engineering of Evoloid gearing; and the second was presented to the National Conference on Power Transmitting here in Philadelphia in 1978.

Q. And that dealt with what?

A. That dealt with the uses of Evoloid — or excuse me, of Roth grearing.

Q. I was just going to comment on your use of the term "Evoloid."

A. I'm sorry.

Q. What patents, if any, have been issued to you in your name?

A. I have approximately five patents in my name, and they deal with mechanisms in valve actuators and the general form of valve actuators.

Q. Do valve actuators include gearing?

A. Yes, they do

* * *

Q. Now, Mr. Berlinger, I would like you to refer to what has been identified as Plaintiff's Exhibit 1, the Roth 736 Patent.

Have you read that patent or studied that patent before?

A. Yes, sir.

Q. Do you find in that patent a teaching of how to make a gear combination including a pinion and a gear?

A. Yes.

Q. Have you, by you, I mean you and Quaker City Gear Works, made gear combinations including a pinion and a gear in accordance with the teachings that you got from the Roth Patent?

A. Yes.

Q. Are the models of Exhibits 30, 31 and 32 made in accordance with the teaching of the Roth Patent?

MR. FLEMING: Judge, another objection, please, on absolute lack of foundation for that question.

THE COURT: Overruled.

THE WITNESS: Yes.

* * *

Q. All right. What is this German Industrial Standard business that is referred to there?

A. It is a German Standard very similar to American Standards with regard to rack forms such as that hob that we passed through the jury.

Q. The patent contains several references to this German Industrial Standard 58,400.

A. That's correct.

Q. It appears in here about four or five times.

A. Yes.

Q. It says a September '63 draft, is that correct?

A. I'd have to look, sir.

In Calim Five, yes, it does draft, September 1963.

Q. Well, look in Column 3 for example, down about line 37 it mentions it again, doesn't it?

A. Yes, sir.

Q. Have you ever seen that 1963 draft?

A. I've seen 58,400. Whether it was that draft, I can't recall.

Q. So you can't testify that you have ever seen the September 1963 draft, can you?

A. No, sir.

Q. How can you —

A. Not that draft.

Q. Well, that is what the patent refers to.

A. I've looked at a lot of drafts, Mr. Fleming. I can't remember the draft date. I am sorry.

Q. But you can't state positively here now to this jury that you have seen the September '63, can you?

A. No, sir.

Q. Then how can you say it's similar to some other standard in the United States, if you have never seen it?

A. I cannot say for sure that I have seen the 58,400 draft September 1963. I have examined other drafts of 58,400 many times.

Q. Well, if you haven't seen the September '63 draft, you don't know what it — you don't know what it shows, do you?

A. I don't know what it shows?

Q. That's right.

A. I have a very good idea of what it shows.

Q. But that is speculation; isn't it?

A. From my experience in the gear field, I would say that I might be quite accurate at determining —

Q. But it is speculation. You can't tell these jurors for sure what is in a document that you've never seen, can you?

A. I don't know whether I have ever seen it or not.

Q. Well, then, you can't sit here and tell them that it is similar to something else if you don't know if you have ever seen it; isn't that true?

A. Yes.

Q. All right. Now, you said that you have seen other drafts.

Is this a standard that is used — is it in Europe?

A. Yes.

Q. Skil doesn't sue [sic use] that German business to make its gears, does it?

A. It doesn't elect to.

Q. Does Skil use it to your knowledge? Yes or no.

A. No, sir. To my knowledge it does not use it.

Q. All right. Does your company use it either?

A. No.

Q. Do you use the AGMA standards?

A. That's correct. Yes, we do.

Q. Don't you understand that is what Skil uses too?

A. They may or may not, but I would assume they'd use the American standard.

Q. And AGMA stands for the American Gear Manufacturers Association; isn't that right?

A. Yes, sir.

DRAGO DIRECT EXAMINATION — called as a witness by Quaker City

BY MR. LOGAN:

Q. Would you state your full name, Mr. Drago?

A. Raymond J. Drago.

Q. And your address?

A. 24 Marlboro Lane, Glen Mills, Pennsylvania.

Q. What was your educational background after high school?

A. I have a Bachelor of Mechanical Engineering from the City University of New York. I have a Master's in Engineering from the Pennsylvania State University, and a Master's degree in Structural Engineering from Drexel University.

Q. By whom are you presently employed?

A. By the Boeing-Vertol Company in Philadelphia.

Q. When were you first employed by Boeing-Vertol?

A. 1967.

Q. And have you been employed ever since that date by Boeing-Vertol?

A. Yes, I have.

Q. What have been your duties at Boeing-Vertol from 1967 to the present?

A. Well, during the first year with the company, I participated in a familiarization type training program, but since that time, after the first year, I've been in the Advanced Power Train Drive Systems, Research and Development Group. In that group it's been our responsibility to do all of the research and development for that division and for the rest of the Boeing Company in the area of mechanical power transmission and to provide assistance with other design groups.

Q. Yes. What type of work do you do with your R&D group for Boeing?

A. The type of work that we do is related to mechanical power transmissions. We investigate various phenomena related to mechanical power transmissions, including gear tooth forms, strength analysis, durability analysis, design, materials, metallurgy.

Q. Is this gear drive for helicopters?

A. In part, yes.

Q. Do you work in gearing primarily in the helicopter area?

A. My work for Boeing is largely in the helicopter area, although we encompass many other fields.

Q. Now, you also do consulting you said with other divisions of the Boeing Company?

A. That's correct.

Q. What type of consulting do you do or what type of product do you consult with for these — with these other divisions?

A. Well, Boeing is a large company and they manufacture a wide variety of products. Some of the areas that I've been involved in are Marine drives for military ships, for commercial ships. The jet foil that is used from Hong Kong to the mainland, for example, I've worked on that drive system. I worked on the windmills that are currently being sponsored by NASA. And I've worked on some more mundane things, like models for windmills, drives for torque tools that are used to drive down large nuts in assemblies, things of that nature.

Q. And they're examples of what you've done?

A. Yes, sir.

Q. Do you also have an outside consulting business?

A. Yes, I do.

Q. What is the function of your outside consulting business?

A. To provide assistance to various clients in various areas of mechanical power transmission. The consulting business is limited primarily to mechanical power transmission, gearing, if you will.

Q. Is that consulting done with Boeing's knowledge?

A. Yes, sir, it is.

Q. Is that a usual practice for a company to permit an engineer to do outside consulting?

A. I would say it is not usual, no.

Q. Are you a registered professional engineer?

A. Yes, I am. I am licensed in Pennsylvania.

Q. Now, Mr. Drago, I would like you to refer to what has been marked as Plaintiff's Exhibit 38.

A. Yes.

Q. And under the area of publications there are listed a total of 36 publications; is that correct?

A. 36 at this time, yes.

Q. Are these papers papers that you have prepared, publications that you have prepared?

A. Yes, sir.

Q. And for whom have you prepared them?

A. Many different areas.

Q. What types of technical societies have they been presented to or prepared for?

A. The majority of the technical papers have been prepared for the American Gear Manufacturers Association. I believe that accounts for probably 10 or 11 or something of that nature. Several other societies, the American Society of Civil Engineers, European Rotocraft Forum, American Helicopter Society, American Institute of Aeronautics and Astronautics, International Federation for the Theory of Mechanisms in Machines, American Society of Mechanical Engineers.

Q. Now, these publications cover the period from 1972 through 1982; is that correct?

A. That is correct.

Q. In addition to your work as a consultant and your work for Boeing, did you have any teaching activity?

A. Yes, I do.

Q. What is your teaching activity?

A. I teach seminars in various aspects of gear design.

Q. And where have you taught them?

A. Various locations. I teach at the University of Wisconsin in Milwaukee, Wisconsin. I have taught at Boeing and I'm scheduled to teach several, actually in the next couple of weeks.

Q. At — where will these several be?

A. Ford Motor Company in Livonia, Michigan, has requested that I present a noise seminar there. I am currently negotiating with a local company to present the fundamentals of gear design seminar and there are ne-

gotiations underway with the Navy Department in Warminister to present the course to their personnel.

Q. And how many times have you presented this seminar at the University of Wisconsin?

A. The one in two weeks will be the third.

Q. And how many hours long is this seminar, how many hours of teaching?

A. The ones at the University of Wisconsin are actually two different seminars. One is in the fundamentals of gear design and this requires three 8-hour days.

The second one that I have presented there is in gear system design for minimum noise and that requires two 8-hour days.

Q. Have you also been requested to write a chapter for a technical book that is to be published?

A. Yes, I have.

Q. And who is the publisher?

A. McGraw Hill.

Q. Are they a leading publisher of engineering textbooks and — for the college and professional level?

A. Yes, they are.

Q. And what is the title of the chapter?

A. Helical gearing.

Q. And when will that book be published?

A. My first draft is due sometime this summer and I really don't know when the book will be published. Probably within the next year or two. It takes quite a while for a technical book to come out.

Q. Are you a member of any technical associations?

A. Yes, I am.

Q. Which ones?

A. American Society of Mechanical Engineers and the American Gear Manufacturers Association.

Q. Have you served in any technical committees of the American Gear Manufacturers Association?

A. Yes, several.

MR. LOGAN: Your Honor, at this time I would like to offer Mr. Drago as an expert.

THE COURT: Do you wish to examine first?

MR. FLEMING: Yes, sir, I'd like to, please. (Cross-Examination on voir dire.)

BY MR. FLEMING:

Q. Mr. Drago, just looking here at some of your publications for example, number one, the title is Design, Fabricate, Test and Evaluate Spiral Bevel Support Bearings. Does that have to do with bearings?

A. It has to do with bearings that support spiral bevel gears, a gear type commonly used in helicopters.

Q. You agree that the subject matter in this lawsuit has to do with fine pitch gears?

A. The subject matter of this lawsuit, as I understood, had to do with the Roth Patent.

Q. Don't you — do you understand the term "fine pitch gearing"?

A. Certainly.

Q. Does the Roth Patent relate to "fine pitch gearing"?

A. The Roth Patent relates to gearing.

Q. Does it relate to "fine pitch gearing"? That calls for a yes or no answer.

A. Yes, it does.

Q. Do any of your papers here pertain to "fine pitch gearing"?

A. Yes, I would say they do.

Q. Well, identify them by number.

A. Any paper that deals with gear theory, deals with fine or course pitch.

Q. I am asking you if any of these papers deal with the subject matter and discuss in the paper "fine pitch gearing"?

A. I don't believe any of the papers specifically discuss "fine pitch gearing" per se.

Q. Not on one of the 36, correct?

A. As far as I can remember, that is correct.

Q. All right. What kind of work, if any, have you done in fine pitch gearing?

A. I have done some work on tool torquing drives, fuel controls, small gear motors and, of course, some of the evoloid designs that I've worked on, Roth patent designs that I've worked on.

Q. Have you consulted previously for the Quaker City Gear Works?

A. Yes, I have.

Q. Have you done any work on power tools, other than these torque drills you referred to?

A. Not that I can recall.

Q. In those torque tools that you referred to, do they have a pinion gear in there?

A. Yes, sir.

Q. What's the number of teeth on the pinion?

A. In a specific application?

Q. What's the lowest number of teeth that you have ever worked on in that application?

A. Probably two or three.

Q. This is, of course, a helix?

A. Yes.

Q. This work that you've done, this consulting work that you've done for Quaker, what does that entail?

A. A variety of products, including design of some of the gear boxes that they have sold to various clients.

Q. And that involved helical gearing?

A. Yes, sir.

Q. How many teeth on the pinion there?

A. Various numbers, from very low numbers, like three or four, up to 20 or 30 or 50.

Q. I understand from your testimony that a large part of your work with the Boeing Company is with respect to these helicopters, correct?

A. That is correct.

Q. That is not fine pitch tooth gearing there, is it?

A. The mechanical power part of it is not. The control part of it is.

MR. FLEMING: Well, Judge, there is a question of going to the weight. I don't think the witness has got

much experience in the particular subject matter of this lawsuit, but I will move that he not be permitted to testify.

Thank you, sir.

THE COURT: You may examine him.

Is this witness an expert basically in gearing?

MR. LOGAN: Yes, sir, in gearing and gear design and testing gears.

* * *

Q. Now, if one wanted to make a gear of the Roth patent, where would one go to get the necessary information?

A. There are two sources of information. Number one, we would assume that someone who was going to design a gear was a gear designer and had some background in that field, so he would certainly draw on his own knowledge.

Number two, for those items, specific to the Roth design, he would have to go to the Roth patent.

Q. Does the Roth patent teach a gear designer everything he would have — need to make a gear, a described in the Roth patent?

A. No, sir.

Q. What does it not teach him?

A. It doesn't teach him everything else he needs to know about gear design, strength analysis, durability, basic geometry. For example, it doesn't teach him what diametral pitch means.

Q. Let's say we have a competent gear designer and he wants to make a gear in accordance with the Roth patent, can he go to the Roth patent and get everything he needs to know that is not in his own present knowledge, to design a gear of the Roth patent?

A. If he were a competent gear designer, yes, sir.

* * *

Q. Mr. Drago, we've heard witnesses testify as to the inability to understand the Roth patent. Have you ever had any difficulty in understanding the Roth patent?

A. No, sir.

Q. Have you ever had any difficulty in determining how to make a gear combination following the teachings of the Roth patent?

A. No, sir.

Q. Have you ever made any such combinations?

A. Yes.

Q. Well, let's change that. Have you ever designed any such combinations?

A. Yes.

Q. Have they been made?

A. Yes.

Q. How many?

A. I would be hard pressed to say exactly, but I would imagine a couple of dozen.

Q. Did you ever have any problem understanding claims one and three of the Roth patent?

A. No, sir.

Q. Could you take a gear combination and by proper inspection and calculation determine whether or not that gear combination came within the scope of claims one to three of the Roth patent?

A. You mean, could I take a physical piece of hardware and determine it?

Q. And by proper inspection.

A. If I had proper inspection equipment, certainly.

Q. Does the German Roth patent in any way, in your opinion, reflect on the correctness of the equation that's contained in claim one of the Roth patent?

MR. FLEMING: I am going to object to that.

ROTH DIRECT via interpreter — called as a witness by Skil

Q. I'm not clear as to whether the 58,400 refers to the pinion or the wheel.

A. To the wheel.

Q. Is it necessary to have information from this 58,400 standard to design the wheel?

A. Yes, this is necessary.

* * *

ROTH DIRECT — called as a witness by Skil

Now, referring to the United States patent, doesn't this mean that the sine of the helix angle must be less than this value?

A. Yes.

Q. Doesn't this formula mean that the sine of the helix angle must be greater than or equal to this value?

A. In the German patent, in the German patent there is on the right side given a fraction and in the U.S. patent there is given a fixed value.

This says in the American U.S. patent is given a limited value and how to interpret this, it is done in the German application, through an example.

May I read it, the German patent?

Q. I only want him to read from what is in the record of this case.

MR. FLEMING: Judge, I should have offered into evidence Defendant's Exhibit 25 which is the foil wrapper of the patent.

THE COURT: All right.

(Defendant's Exhibit 25 received in evidence.)

THE WITNESS: Page 19.

(Witness reading in German.)

THE WITNESS: The interpretation of the formula is given to an example and through the text by the text in the text.

BY MR. FLEMING:

Q. Why is the — aren't these two formulas opposite to each other?

A. The U.S. patent is dealing with a further, broader area and the German with a limited, more limited area.

THE INTERPRETER: I am sorry. The U.S. patent has a smaller, or deals with a smaller area.

Q. Does the U.S. patent establish a certain limit for the helix angle?

A. No, a deeper limit, lower limit.

Q. Doesn't the U.S. patent say that the helix angle must be less than the value?

A. Yes, the optimum helix angle.

Q. Doesn't the United States patent say that the helix angle must be less than it's value?

A. Yes, smaller than the value, up 1.5.

Q. Doesn't the German patent say that the helix angle must be greater than the same value?

A. The German gives us a bigger area for the helix angle.

Q. How does that make any sense for the U.S. — United States patent to establish — I will rephrase the question. How does it make —

MR. LOGAN: Your Honor, objection. The German patent is not in issue here. And he's asking him as to the scope of the German patent. The Germans are not involved in this and it's not at issue.

MR. FLEMING: We're not getting into the German patent at all. We have enough problems with the U.S., but — and this is typical when you base a United States patent application on a foreign patent application. You file a copy of the foreign application and, indeed, the United States application, they are actually claiming benefit of the earlier filing of the German patent.

MR. LOGAN: Can we have a side bar on this?

THE COURT: Well, it may be a good time to take a recess for the witness and the witness may take a fifteen-minute recess. The jury may take a fifteen-minute recess. Then I can hear you right here in open court.

Ladies and gentlemen, you may step out.

(Whereupon the jury exited the courtroom at 11:05 a.m.)

THE COURT: Would you tell the witness he may step out for fifteen minutes?

(Whereupon the interpreter instructed the witness that he is excused for 15 minutes.)

MR. LOGAN: If you will recall in the pretrial, Mr. Fleming was talking about the German application and

how different it was from the U.S. application, and we weren't entitled to the priority date. And now he's having the witness refer to the German application to interpret the U.S. application as though they were exactly the same, while he took just the opposite position in our last argument at the pretrial, our final pretrial.

THE COURT: He's not suggesting that they're the same.

MR. FLEMING: No.

MR. LOGAN: If they are different, he shouldn't be referring—

THE COURT: He suggested there's a fundamental difference.

MR. LOGAN: If they are different, he shouldn't be referring to the German text for this purpose.

MR. FLEMING: Judge, there are many differences and that's part of our argument, and I am gathering from Mr. Logan there's no dispute that the plaintiffs are not entitled to the German priority date. I'd like to get that on the record, and that we'll take one step at a time. That is my understanding.

THE COURT: I don't know that he has said that.

MR. LOGAN: No, I have not said that.

THE COURT: If you are entitled to the priority date, what makes this an appropriate, relevant inquiry?

MR. LOGAN: I'd like to know if they're relying on the difference between the dates.

MR. FLEMING: Judge, yes, but look, this is becoming absurd. He's now telling me that he's relying on the German application for a priority date. I am asking the witness to show that they're not entitled to it, it's a different equation, it gives opposite results. I can't think of any more appropriate line of inquiry.

THE COURT: I can't either.

MR. FLEMING: What we're going to get to later —

THE COURT: That is if you're relying upon the priority date.

MR. FLEMING: And even, say, some significance, his thesis popped out in the interim and was published in June.

MR. LOGAN: Well, the thesis was published a month before the U.S. application, so that's not prior art against the U.S. application.

MR. FLEMING: If you're only entitled to the United States findings, then you have a problem.

MR. LOGAN: We don't have a problem on that.

THE COURT: Whether you have a problem with it or not, it's your position as to the priority date, that determines the relevance of the evidence and, you know, if your position is one, then it may not be relevant. If it is something else, then it may be relevant. I don't know what your position is.

MR. LOGAN: We don't have to rely on the German priority date, your Honor.

THE COURT: I don't know what that means. If you tell me you do not rely upon the German priority date, I know what that means. And that is your lead position, that is your leg position.

MR. LOGAN: That is right, your Honor, we don't.

MR. FLEMING: I understand that we now have a stipulation that is on the record, that the patent in suit is not entitled to the German priority date and is entitled only to the date of filing in the United States Patent Office. That is my understanding; is that correct, Counsel?

MR. LOGAN: It's entitled only to the date of filing in United States Patent Office, yes.

MR. FLEMING: And plaintiffs have given up all right to claim the foreign priority date; is that correct?

MR. LOGAN: Yes, your Honor.

MR. FLEMING: Judge, could we just have the reporter explain to Professor Roth that we have just read the last two or three pages of the transcript to bring the jury — for purposes of continuity.

THE COURT: She may so explain.

(Pause.)

(LOUISE MARIE GAEFFKE, resumes as Interpreter for Professor Roth.)

KARLHEINZ ROTH, resumes.

DIRECT EXAMINATION (Continuing)

BY MR. FLEMING:

Q. Now, Professor Roth, would you —

THE WITNESS: We will need Plaintiff's Exhibit 1.

BY MR. FLEMING:

Q. Now, Professor Roth, by referring to your patent, Plaintiff's Exhibit 1, will you tell us specifically what you believe Mr. Thoen would need from the patent to convert his spur to a helical?

A. He needs first the basic rack profile.

Q. Point specifically to the column and the line you are referring to.

A. It is very difficult to say this now in the hurry, but it says in my text it is said in my description that the addendum has to be small and the dedendum big.

Q. How small and how big?

A. This is depending from the number of teeth. To give an example, I have a Figure 1 and 2 for two number of teeth. I have showed these kind of profiles. In Figure 1 I have to look quickly where it is said — I think there is a one-teeth pinion. I have to look it up because it is said here —

Q. Professor Roth, Mr. Thoen in 1961 had designed a four-tooth spur pinion which is shown in these papers; isn't that true?

THE INTERPRETER: 1961?

MR. FLEMING: 1961.

THE WITNESS: Yes, this I have seen.

BY MR. FLEMING:

Q. Now, let's concentrate on a four-tooth pinion. Now, what would you need from your patent to convert this four-tooth spur pinion to helical form?

A. A basic rack profile which you have to use in the normal rack profile for helical gearing, in the normal pro-

file. He has to give a normal profile to produce four-teeth pinion.

I refer always to normal profiles.

Q. Can you point to any specific formula or data in your patent that Mr. Thoen would have to refer to to convert his four-tooth spur to a four-tooth helical?

A. This is, this is not the subject of may patent, to change, to deform, to change a four spur to a helix because I have made these kind of four-teeth pinions in other pieces of work. But you understand what I am mean, I want to tell you why Mr. Thoen with the basic rack profile for a spur gear not was able to make a helix gear.

This model here, that you have put on my table has the profile of Mr. Thoen, if it is the same in the face cut and for this he cannot make a helix gear as it is lying here in front of me.

Q. Professor Roth, you told us last Friday that Mr. Thoen would need information from your patent to convert his spur to a helical and I am now asking you for the benefit of the jury, the Court and myself, to tell us specifically what you were referring to in your patent.

A. He has, he has not to give us the basic rack profile for the face cut but for the normal cut. The whole patent refers only to basic rack profiles in the normal cut.

If you allow me, I'm able to demonstrate this on your beautiful model that everybody can understand.

MR. FLEMING: And the record will show, I'm handing the witness Defendant's Exhibit 17.

THE WITNESS: If you produce a spur gear, you need a hob milling cutter which has this kind of form and so you get back and forth. You turn the wheel and then you receive a spur gear.

So as it is produced in each plant.

If you now want to make a helical gear, so as it is now here, then you will see that this hob milling cutter is not fitting into this form now and the identification of a wheel is also done with the basic rack profile the same

way as you identify a person by name, birthdate and not by his suit as he is at that moment wearing.

If you want to know if it is the wheel or is it not, then w/ have to know which kind of basic rack profile was u ed during production. With this rack profile I cannot do it. With a basic rack profile, I have produced the spur gear. I cannot make the helix. I need another profile.

And if Mr. Thoen says that he has — he could produce this from that, then I say he cannot do it. And the same he was not able to do here, but he could cut it into laminates and then bring them together by a process.

Now I am asking which one is the pinion of Mr. Thoen or that in the normal profile. With this profile which he has here in the spur, he cannot make the helix gear.

MR. FLEMING: For the record, the witness has been referring or has been using a little piece of cardboard to simulate a rack, so I marked that as Defendant's Exhibit 205.

BY MR. FLEMING:

Q. Where in your patent would one find the information to develop this new rack you are talking about?

A. It is said on Figure — column two, line 28, there it is said Figure 1 is the basic rack profile in the normal cut. Figure 2 is the basic rack profile in the normal cut.

Q. Are your referring to Figure 2 in the patent?

A. Yes, Figures 1 and 2 in the American patent.

Q. Don't those show racks for one and two-tooth pinions?

A. Yes. Because they are the most difficult. They are used as an example. But all others you can also apply. I don't know another method to produce helical gears.

MR. FLEMING: Let me have one moment, your Honor.

BY MR. FLEMING:

Q. Can you point to anything else in your patent that you say Mr. Thoen would need?

A. I would need to have his basic rack profile, but I can say what one would have to have. This point I just made is valid for all helical gears. Helix gears, according to the patent, has very small number of teeth. You have to take other measurements.

Q. The question is —

A. Now, I will show you what you need besides.

First, you need basic rack profiles with a small addendum and a large addendum. Number two, you need to — you have to have a large positive deviation, profile deviation, which is not allowed to be either too big or too small. If a profile deviation is too big and you have here values, then the upper part of tooth is just cut away. If it's too small, then you get undercuts. I am not done yet.

The basic rack profile has to be this way, that the contact ratio is big enough. The contact ratios, the profile contact ratios, and this is the most important point, is when there are these small gears, most of the times, too small. And you have to face contact, you have to supplement these face contact ratios so far that they are in one part with the total contact ratio. If you don't go according to the patent, then the tooth either becomes too wide — the angle becomes too big. Both is bad.

Q. Now, I will ask the question hopefully one more time. I asked you to point to specific data in the patent that you say Mr. Thoen would have needed. And you pointed to the rack profiles in Figure 1 and 2.

Now, the question is, can you point to any specific formula number of technical data in the patent that you say Mr. Thoen would need to make the calculations?

A. Yes. In column four, line 64, there it is said the addendum — the addendum has to be 0.6. In the range of size, it can be a little bit bigger, it can be a little smaller.

Q. Is .6 a ratio?

A. It is the head size factor. If you multiply this with the modular, then you get the absolute height.

BOBEL DIRECT — called as a witness by Skil

Q. Now, you have a copy or you have the original patent up there with you. That is Plaintiff's Exhibit 1.

A. This one.

Q. That is in a little different form than you've seen because the front page is the original, has the seal and all that sort of thing.

Now, again, I believe I asked you this, but I just want to refresh everyone's recollection.

When was the first time that you actually read that patent through?

A. Approximately a week and a half to two weeks ago.

Q. And was that in accordance with my request?

A. Yes. You sent it in the mail to me.

Q. And that was for purposes of this lawsuit?

A. Yes.

Q. How much total time do you think you spent reading the patent?

A. Oh, total time, about an hour and a half to two hours. I read it once for about 45 minutes when you sent it to me and I read it on the plane over here.

Q. Do you find anything in the patent that's helpful that as far as designing pinions with small numbers of teeth? That is helpful to you I should say.

A. Not helpful to me no, sir.

Q. Do you find that patent confusing?

A. Very definitely. I read it twice, and after the second time I think I was more confused and bewildered than I was the first time.

To be honest with you, after hearing all the testimony for the last couple of days, I am — I feel very inadequate. I am confused.

Q. Did the testimony help you in any way or hurt you as far as understanding the patent?

A. It didn't help me.

Q. Do you — does the patent describe this supposed invention in clear, concise and exact terms?

A. No, it does not.

Q. Does it describe the manner of making the so-called Roth gears in clear, concise and exact terms?

A. No, it doesn't.

SKIL — Motion for Directed Verdict

MR. FLEMING: Your Honor, we, the defendant moves for a directed verdict on both the invalidity and the non-infringement.

First on the invalidity, we think the evidence shows that the patent fails under Section 112 and Section 103.

First on the 112, I think it ought to be perfectly clear to everyone if there is ever a confusing patent, it's this one. Another thing, Judge, that is absolutely fatal to the validity of this patent, as a matter of law, is this: The patent contains several references to the German standard DIM 58,400 September 1963. It's — that document is unavailable. Plaintiffs, notwithstanding our repeated request, have been unable to produce it.

Now, when Professor Roth testified, and I refer to Volume 4, pages — or page 16, that is 4.116, he testified that it was necessary to have that standard to design a gear. Judge, we are entitled to a directed verdict of non-validity in this case at that point at all — alone. Cannot satisfy the requirements of Section 112 which require not only that the purported invention, but the manner and method of making it be pointed out in clear, concise and exact terms.

And when you refer to an unavailable foreign publication and when you have the testimony of a party to the suit who happens to be the inventor, which says it is necessary, Judge, this case is going to be over on that point. In fact, maybe I should just stop there and let them respond to that before I go to anything else.

THE COURT: No, why don't you make your whole argument.

MR. FLEMING: All right. Now, the other point is the obviousness. There's clearly no presumption of validity in this case. Mr. Thoen went through the five ref-

erences the examiner cited. It's perfectly clear they're all out in left field.

The United States Examiner didn't come close to finding prior art dealing with these pinions of low numbers of teeth and really after much arduous cross-examination of the witnesses, I think the record finally shows, not only from, of course, our own witness, Mr. Thoen, but from the plaintiff's witnesses, that all the technology that you needed to do these gears is right there in these publications.

The only thing they're trying to hang their hat on are these so-called warnings and admonitions, but that is an unrealistic way to approach it. And moreover, we have evidence in the record, of course, that these warnings were disregarded. Mr. Kaman testified that even back in his days at Thor, they had five-tooth helical involutes.

So, they're hanging that on that lower number.

MR. FERRILL: Your Honor, may I inform the Court of one point that my colleague just pointed out to me, sir? The German standard No. 58,400 should someone in the United States want to make reference to the German standard in connection with this sentence where it says, according to the invention it's preferred to use as the basic profile for the wheel the standard profile for precision work as laid down by German Industrial Standard No. 58,400 (draft of September 1963) which your Honor will note is the date of the — is the time this case was being filed and Mr. Logan points out to me that we have the German — the versions of this German Industrial standard for precision work as laid down for No. 58,400 in three of its motions before and after this date, not happening to have that particular one issue of it. We have the '61 — we have the '61, '62 and '65.

MR. LOGAN: Yes.

MR. FERRILL: '61, '62 and '65. I submit, your Honor, that it was somewhat of a — that our opponent is straining we submit to make —

THE COURT: I thought I made this before.

MR. FLEMING: Judge, their own witness said it was necessary to have this particular draft.

THE COURT: You know, I thought we talked about this before in a pretrial conference, but I also assumed that, you know, that certainly if there's a standard which exists, that if it hasn't been produced up to now, it will be produced by the time of trial.

MR. FLEMING: That's exactly —

THE COURT: And that this is just going to float away. And I really never thought of any importance.

MR. FLEMING: That's exactly what I thought. I had my Rule 34. I even had it for a list of the exhibits, to see if it was going to appear. Of course, they didn't list it as an exhibit. They couldn't produce it.

I did bring that up at the time, several months ago. They had a real problem —

THE COURT: So it isn't that it is a new item to me. You know, I had a feeling that I had before. I think, you know, practically I think Rule 50(b) suggests that you go and submit it to the jury and let the jury determine it. I know that that may appear to be inappropriate to defense counsel, but you preserve your legal arguments and after this long, perhaps the jury will —

MR. FLEMING: Judge, it's a waste of everyone's time, if that patent is invalid as a matter of law, and it will be inconvenient and expensive for my client, but I'm not worried about reversal on this one.

THE COURT: If it becomes clear to me as a matter of law that you're entitled to a directed verdict, even though I think that the most convenient thing to do is to submit it to the jury, I will give you your verdict as a matter of law.

If I have doubts as to the law —

MR. FLEMING: Sure.

THE COURT: — I'm going to submit it to the jury because there's no reason —

MR. FLEMING: I agree.

THE COURT: —to do — there's no reason to waste all these days of testimony.

MR. FLEMING: I agree.

THE COURT: And not submit it to the jury in that case.

But if it becomes clear to me —

MR. FLEMING: That's right.

THE COURT: — that as a matter of law there is no possible way in which this problem can be cured, obviously, while I might be wrong on the law, I think I — to a party to moves for a directed verdict to rule on a motion of a directed verdict, if it is not clear, and I need additional time for briefing and so forth, I probably would submit it to the jury, knowing under 50(b) that you still preserve your question of law. And it is purely a question of law.

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SKIL — Summation to Jury on Interrogatory 11.

The next special verdict is number 11, which gets into this question now of the sufficiency of the patent. How well it describes what this invention is supposed to be. Now, in that regard, ladies and gentlemen, I imagine a lot of you are wondering at this time, what is this invention? Have these people really tried to use the patent and tried to explain something to you in understandable language? I don't think they have. They keep talking terms of results, efficiency. Everyone knows it's efficiency to go to helical gearing. That's a well known phenomenon.

* * *

And another thing, ladies and gentlemen, I remember distinctly when this case started off. I remember all kinds of testimony about this, that and the other thing. Nothing about the patent. Normally in a patent case, the plaintiff is proud of the patent. He'll start right off, put a witness on the stand, start going through it in chaper and verse to explain to you what it's supposed to be about. Not in this case. They tried to avoid the patent. Even in their infringement determinations, what are they used for in infringement determinations? A 12-page document, 26 steps that aren't shown in the patent. When it comes time to proving infringement, they don't use the patent. They use some document that makes reference to all kinds of steps and measurements beyond the patent.

Now, the first special verdict that you're going to be asked to do is whether the patent contains a written description of the alleged invention. You're going to be instructed by the Court that the patent has to do two things: It has to describe the alleged invention and the manner of making and using it in full, clear, concise and exact terms. Those — that's what the patent laws say.

In this patent, with mistakes in formulas in claims, that inequality expression with this other formula that we had so much testimony about in column four of the

patent, about line 72, this H_k and all this business. Think of the inconsistencies and the errors in the patent. Think of Mr. Bobel's testimony.

Now, here's a man who's supposed to get some benefit out of this patent. He's an ordinary guy out there, employed by a power tool company to design gears. Of course, the evidence shows that he didn't even see the patent about a week and a half before trial, when I asked him to read it for the first time. He testified to that. That testimony stands absolutely unchallenged. He said the patent wouldn't have helped him at all, as I remember. It confused him and the more people he heard up on the stand, it still confused him. So does a patent like that satisfy the requirements for full, clear, concise terms?

And as the patent makes reference to some 1963 German publication that Professor Roth says was necessary to make his gears. That hasn't been produced in the record. So how can a patent point out everything in full, concise terms when you have to refer to some German patent that the plaintiffs haven't produced?

Now, again, you've got conflicting testimony. You notice Bobel. He's the guy out there who was supposed to be able to design power tools, like my company, my client, and he said, they're the ones that set him back. He didn't say that, but words to that effect, and you'll remember the gist of what he said.

On the other hand, you have Mr. Thoen who pointed out errors in the patent and you remember Mr. Drago and Mr. Berlinger, and that's the decision you're going to have to make, ladies and gentlemen. We know that you're not going to go back into the juryroom and get your pocket calculators and go through that formula and we know you can't do that. You've got to decide those questions. You've got to think who are the witnesses up there that were really trying to help you and really trying to put the evidence before you who are answering questions in a forthright manner.

For example, Mr. Thoen who went up there and literally derived the formula. Remember his three circles going from here to Chicago? You have to compare that on the one hand, and you've got to compare plaintiffs on tne other hand of changing exhibits. They give us exhibits before trial that are supposed to explain how you can compute infringement. Mr. Berlinger gets up there on the witness stand and has a new document for the first time. It has changes in it, which is now marked as Plaintiff's Exhibit 200. Those are the things that you've got to consider and to determine who do you think — whose witnesses were up there trying to help you determine whether that equation had anything — was wrong or incorrect.

So our special verdicts 11 and 12 go to those two issues.

From the Court's instructions to the Jury.

Now, we have certain interrogatories here which relate to specifications and claims. And if you will look at Interrogatories 11 and — 11 first, does the specification of the Roth patent, that is, the portion of the patent in Columns 1, 2, 3 and 4 and the first four lines of Column 5, contain a written description, including its drawings and text, of the alleged invention in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected to make and use the same. You've heard a lot of evidence in this case, and once again I will not repeat it or make reference to who called the various witness, but there has been lot — a lot of evidence as to this particular issue and it's for your determination.

Now, 12, does the specification of the Roth patent, that is, the portion of the patent in Columns 1, 2, 3, 4 and the first four lines of Column 5, contain a written description including its drawing and test, of the manner and process for making and using the alleged invention in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with

which it most — or with which it is most nearly connected, to make and use the same. And there again, in Number 11, we asked whether — about whether it is clear, whether the invention is. In 12 we ask about making and using the alleged invention. And there have, of course, been evidence to you — submitted to you in regard to that.

DX-29

Rechtsanwalt Bernhard Seidler
Widenmayerstrasse 50
8 Munchen 22, Germany

Re: Improvements in Involute Gear Combinations
U. S. Serial No. 330 130
(Corres. to German Serial No. S 83 289 XII/47h)
Your Ref.: 4920 S/P
Our Ref: Seidler Case 8

Dear Sir:

In reply to your letter dated June 22, 1965, we have amended the application in accordance with your instructions. We are enclosing copies of our response, together with our debit note for the preparation thereof.

In connection with the reference to the German Industrial Standards appearing in the specification and Claim 5, assuming that these Standards are available to the public in printed form, we see no reason why it would be necessary to replace them in the specification by a reference to a corresponding United States Industrial Standard or by a more complete structural description. With respect to the use of this terminology in Claim 5, the situation is not quite so clear, but in our opinion, we believe the claim should be allowed to remain in its original form. We must point out that the use of this type of terminology in a *claim* is quite irregular by U. S. claim writing standards, and we are somewhat surprised that the Examiner did not object thereto. However, it is also true that some U. S. Examiners will allow considerable latitude in claiming an invention providing that the way in which the invention is claimed is not clearly contrary to established procedures. We believe that the Examiner could find no concrete reason for objecting to Claim 5 and, thus, he is prepared to allow it in its present form.

While we would have preferred to write a more exact description of the structure involved, in view of the fact that the claim has been allowed and the Examiner has closed out prosecution on merits and, further, in view of the fact that Claim 5 is a dependent claim, we would suggest that this claim be allowed to remain as it presently is. We would suggest, however, that in any future cases where a similar situation is present that a more complete structural definition of the invention be given, particularly in the claims. We think that the present application involves a unique situation in which the Examiner has gone much farther than is customary in allowing us to claim the invention in this fashion, and we think that it would be highly doubtful that this would be repeated in another case.

Yours very truly,

L. Martin Flynn

LMF/6

Enc: Response (2)
Debit Note (2)

Airmail

35 U.S.C. §112

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

A claim may be written in independent or, if the nature of the case admits, in dependent or multiple dependent form.

Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

A claim in multiple dependent form shall contain a reference, in the alternative only, to more than one claim previously set forth and then specify a further limitation of the subject matter claimed. A multiple dependent claim shall not serve as a basis for any other multiple dependent claim. A multiple dependent claim shall be construed to incorporate by reference all the limitations of the particular claim in relation to which it is being considered.

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

35 U.S.C. §282

A patent shall be presumed valid. Each claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though dependent upon an invalid claim. The burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity.

The following shall be defenses in any action involving the validity or infringement of a patent and shall be pleaded:

(1) Noninfringement, absence of liability for infringement or unenforceability,

(2) Invalidity of the patent or any claim in suit on any ground specified in part II of this title as a condition for patentability,

(3) Invalidity of the patent or any claim in suit for failure to comply with any requirement of sections 112 or 251 of this title,

(4) Any other fact or act made a defense by this title.

In actions involving the validity or infringement of a patent the party asserting invalidity or noninfringement shall give notice in the pleadings or otherwise in writing to the adverse party at least thirty days before the trial, of the country, number, date, and name of the patentee of any patent, the title, date, and page numbers of any publication to be relied upon as anticipation of the patent in suit or, except in actions in the United States Claims Court, as showing the state of the art, and the name and address of any person who may be relied upon as the prior inventor or as having prior knowledge of or as having previously used or offered for sale the invention of the patent in suit. In the absence of such notice proof of the

said matters may not be made at the trial except on such terms as the court requires.

608.01(p) Completeness

Newly filed applications obviously failing to disclose an invention with the clarity required are discussed in §702.01.

A disclosure in an application, to be complete, must contain such description and details as to enable any person skilled in the art or science to which the invention pertains to make and use the invention as of its filing date, *In re Glass*, 181 USPQ 31; 492 F.2d 1228 (CCPA 1974).

While the prior art setting may be mentioned in general terms, the essential novelty, the essence of the invention, must be described in such details, including proportions and techniques where necessary, as to enable those persons skilled in the art to make and utilize the invention.

Specific operative embodiments or examples of the invention must be set forth. Examples and description should be of sufficient scope as to justify the scope of the claims. Markush claims must be provided with support in the disclosure for each member of the Markush group. Where the constitution and formula of a chemical compound is stated only as a probability or speculation, the disclosure is not sufficient to support claims identifying the compound by such composition or formula.

A complete disclosure should include a statement of utility. This usually presents no problem in mechanical cases. In chemical cases, varying degrees of specificity are required.

A disclosure involving a new chemical compound or composition must teach persons skilled in the art how to make the compound or composition. Incomplete teachings may not be completed by reference to subsequently filed applications.

702 Requisites of the Application

When a new application is assigned in the examining group the examiner should review the contents of the application to determine if the application meets the requirements of 35 U.S.C. 111. Any matters affecting the filing date of the application, such as lack of an oath or declaration, filing fee, or claims should be checked before the application is placed in the storage racks to await the first action.

The examiner should be careful to see that the application meets all the requisites set forth in chapter 600 both as to formal matters and as to the completeness and clarity of the disclosure. If all of the requisites are not met, applicant may be called upon for necessary amendments. Such amendments, however, must not include new matter.

RULE 49 (a) F.R.C.P.

Rule 49. Special Verdicts and Interrogatories

(a) SPECIAL VERDICTS. The court may require a jury to return only a special verdict in the form of a special written finding upon each issue of fact. In that event the court may submit to the jury written questions susceptible of categorical or other brief answer or may submit written forms of the several special findings which might properly be made under the pleadings and evidence; or it may use such other method of submitting the issues and requiring the written findings thereon as it deems most appropriate. The court shall give to the jury such explanation and instruction concerning the matter thus submitted as may be necessary to enable the jury to make its findings upon each issue. If in so doing the court omits any issue of fact raised by the pleadings or by the evidence, each party waives his right to a trial by jury of the issue so omitted unless before the jury retires he demands its submission to the jury. As to an issue omit-

ted without such demand the court may make a finding; or, if it fails to do so, it shall be deemed to have made a finding in accord with the judgment on the special verdict.

RULE 50(b) F.R.C.P.

Rule 50. Motion for a Directed Verdict and for Judgment Notwithstanding the Verdict

(b) MOTION FOR JUDGMENT NOTWITHSTANDING THE VERDICT. Whenever a motion for a directed verdict made at the close of all the evidence is denied or for any reason is not granted, the court is deemed to have submitted the action to the jury subject to a later determination of the . . .

(following text cut off on p.53 of F.R.C.P. xerox)

The Constitution of the United States, Article 1, Section 8, Clause 8

The Congress shall have the power to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.

The Constitution of the United States, Amendment VII — Civil Trials

In Suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury, shall be otherwise reexamined in any Court of the United States, than according to the rules of the common law.